حمل الان

مجانا وحصريا

امتحانات رقم (1)







2025

General Exam 1



First Choose the correct answer (1 : 20)

1 A load is attached to a spring where it is in equilibrium, if the load is pulled vertically downwards for a distance 10 cm then it is left to pass by the equilibrium position for the first time after 0.5 s, then ....

	The amplitude of the vibration (cm)	The periodic time (s)
(a)	10	1.5
(b)	10	2
(c)	20	2
(d)	20	1.5

2 Water flows steadily in a tube of radius 3.5 cm at a speed 3 m/s, then the time required to fill a cubic tank of side length 226 cm approximately equals .... ($\pi = 3.14$)

(a) 900 s (b) 1000 s (c) 1100 s (d) 1200 s

3 If the wavelengths of a specific light ray in two different media A and B are 450 nm and 600 nm respectively, the critical angle between the two media is ....

(a) 48.6° and located in medium A
(b) 48.6° and located in medium B
(c) 41.8° and located in medium A
(d) 41.8° and located in medium B

4 A light ray falls on one of the faces of a thin prism of an apex angle 8°, refractive index for the blue light 1.664 and refractive index for the red light 1.644, then the dispersive power for the material of this prism equals ....

(a) 0.05 (b) 0.04 (c) 0.03 (d) 0.02

5 A light ray falls on one of the faces of a triangular prism of refractive index $\sqrt{2}$ at an angle of 45° and emerges from the opposite side at angle of 45°, then the apex angle of the prism is ....

(a) 45° (b) 60° (c) 72° (d) 80°

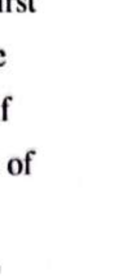
6. In Young's experiment, the distance between the center of the first bright fringe and the center of the central fringe is 2 mm, then the distance between the center of the third dark fringe and the center of the central fringe equals ....

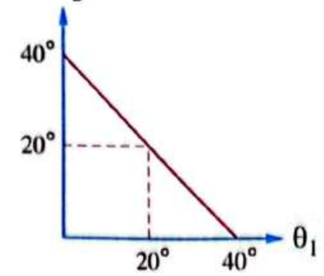
(a) 2 mm (b) 5 mm (c) 6 mm (d) 7 mm

7. A tuning fork is struck, so it makes 2048 complete vibrations in 8 seconds, then the frequency of the fork equals ....

(a) 128 Hz (b) 256 Hz (c) 384 Hz (d) 512 Hz

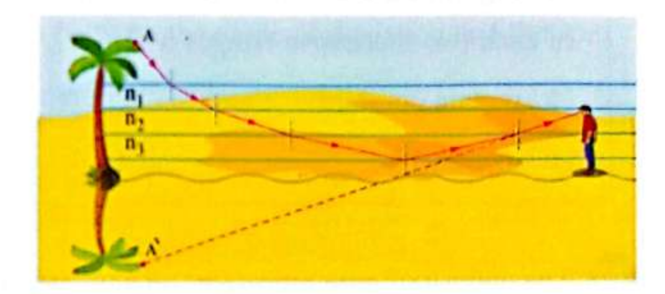
8. The opposite graph represents the relation between the first angle of refraction (θ_1) and the second angle of incidence (ϕ_2) when a light ray passes through a triangular prism. If the critical angle of the prism material is 41.8°, the angle of minimum deviation for the falling light ray is ....





(a) 17.2° (b) 21.7°
(c) 25.4° (d) 30.2°

9. The opposite figure shows the occurrence of mirage, hence the correct order for the speeds of light in the three air layers is ....



(a) $v_1 > v_2 > v_3$
(b) $v_3 > v_1 > v_2$
(c) $v_3 > v_2 > v_1$
(d) $v_1 = v_2 = v_3$

10. A viscous liquid layer of thickness 2.5 mm is covering a ceramic floor. If a square plate of area 0.1 m^2 slides on the floor with uniform speed 0.5 m/s due to a tangential force of 35 N, the coefficient of viscosity of the liquid equals ....

(a) 0.75 $N.s/m^2$ (b) 1.25 $N.s/m^2$ (c) 1.75 $N.s/m^2$ (d) 2.25 $N.s/m^2$

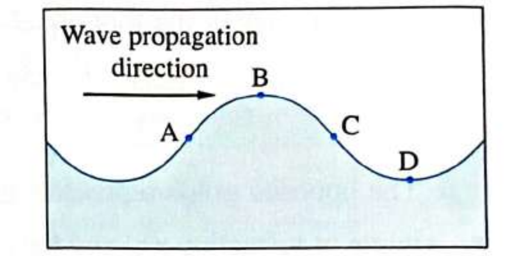
11 The critical angle between two different transparent media is given by the relation;

$\sin \phi_c = \frac{n_2}{n_1}$ and this means that ....

(a) $n_2 < n_1$ (b) $n_2 > n_1$

(c) $n_2 = n_1$ (d) speed of light is the same in the two media

12 The opposite figure shows a vertical section of a wave propagating through water from left to right, so at which two points the instantaneous vertical velocities of water particles are maximum?



(a) A, D (b) B, C

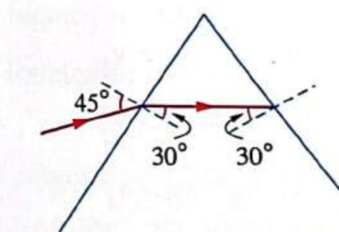
(c) A, C (d) C, D

13 In Young's double-slit experiment a blue light of wavelength λ is used to pass through two narrow slits that are at a distance d from each other, so interference fringes appear with a certain pattern on the observation screen that is at distance R from the slits. If the experiment is repeated under the surface of water, the distance between the centers of each two successive fringes will ....

(a) remain constant (b) decrease

(c) increase (d) be indeterminable

14 The opposite figure represents an equilateral triangular prism of refractive index $\sqrt{2}$, so the angle of deviation equals ....



(a) 30° (b) 45°

(c) 55° (d) 60°

15 Light rays fall on two thin prisms, the apex angle of the first prism is 9° and its refractive index equals 1.5 and the refractive index of the second prism equals 1.75. If the angle of deviation of the light rays in the two prisms is the same, then the apex angle of the second prism equals ....

(a) 6° (b) 7° (c) 8° (d) 9°

16 If the end of a spring coil is moved to make a longitudinal wave of wavelength 30 cm and periodic time 0.1 s then it is moved to make a transverse wave of periodic time 0.2 s that has the same speed as the longitudinal wave, the wavelength of the transverse wave equals ....

(a) 7.5 cm (b) 15 cm (c) 30 cm (d) 60 cm

17 If the ratio of the angle of incidence of a light ray on the interface between glass and another medium to its angle of refraction in the other medium is less than one, then ....

(a) the absolute refractive index of glass is greater than the absolute refractive index of the other medium

(b) the absolute refractive index of glass is less than the absolute refractive index of the other medium

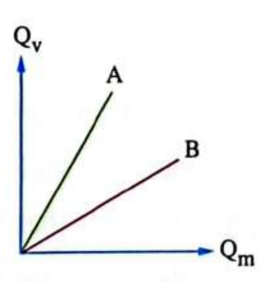
(c) the speed of light in glass is greater than the speed of the light in the other medium

(d) the wavelength of light in glass is greater than that in the medium

18 A light ray falls on one of the faces of a triangular prism with an angle of incidence ϕ and emerges from the opposite face with an angle of emergence $1.25\ \phi$ where the light ray deviates by an angle $0.75\ \phi$, then the ratio between the angle of deviation and the apex angle of the prism $(\frac{\alpha}{A})$ equals ....

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{2}{1}$ (d) $\frac{2}{5}$

19 The opposite graph represents the relation between the volume flow rate (Q_v) and the mass flow rate (Q_m) for the two liquids A and B that flow steadily inside many tubes, so the ratio between the densities of the two liquids $(\frac{\rho_A}{\rho_B})$ is ....



(a) greater than one (b) less than one

(c) equal to one (d) indeterminable

20 The electromagnetic waves for which the diffraction becomes more clearer when they pass through aperture of dimensions 10^{-5} m are ....

(a) X-rays (b) radio waves (c) gamma rays (d) UV waves

Second | Answer the following questions (21 : 23)

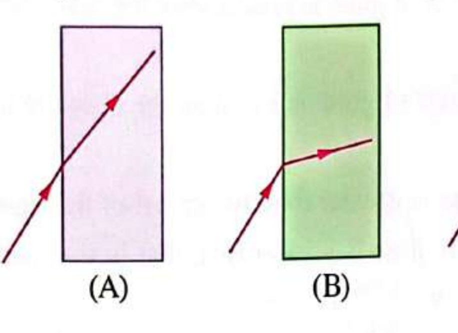
21 Honey flows faster in summer than in winter, what is the reason for this?

....

....

22 The following figures illustrate identical light rays getting incident from air into three different media (A), (B) and (C) with equal angles of incidence.

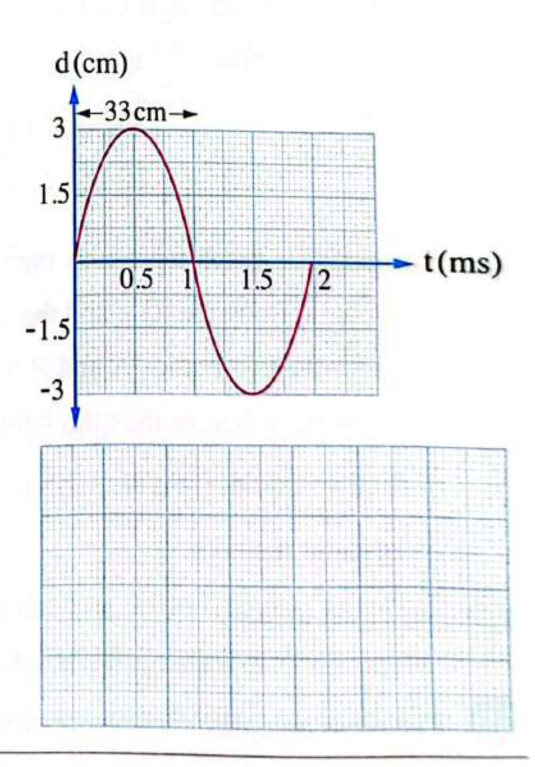
Arrange in an ascending order these media according to their refractive indices.



....

....

23 A sound wave that propagates in air has produced vibrations to the air particles where the opposite graph represents the relation between the displacement (d) of one of the air particles and time (t). **Draw** the relation between the displacement and the time with the same drawing scale for the vibration of one of the air particles that transmit a sound wave of half the wavelength of the first wave and half the amplitude of the first wave.



General Exam 2



First Choose the correct answer (1 : 20)

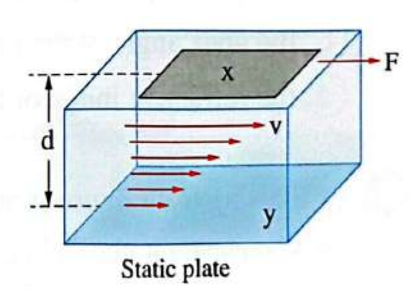
1 In Young's double-slit experiment a blue light of wavelength λ is used to pass through two slits where the distance between them is d, so interference fringes appear on the observation screen which is at a distance R from the slits. If another light of wavelength $1.5\ \lambda$ is used, then to have the same pattern of interference, the observation screen should be at a distance of .... from the slits.

ⓐ $\frac{R}{1.5}$ ⓑ $\frac{R}{0.75}$ ⓒ 0.75 R ⓓ 1.5 R

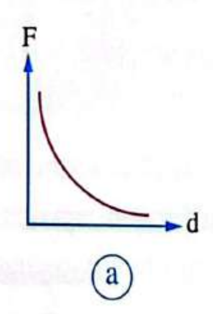
2 The speed of light in a transparent medium is 2×10^8 m/s and its speed in another transparent medium is 2.4×10^8 m/s, then the ratio between the sine of the critical angle of the first medium with air and the sine of the critical angle of the second medium with air $\left(\frac{\sin(\phi_c)_1}{\sin(\phi_c)_2}\right)$ equals ....

ⓐ $\frac{5}{6}$ ⓑ $\frac{6}{5}$ ⓒ $\frac{1}{2}$ ⓓ $\frac{2}{1}$

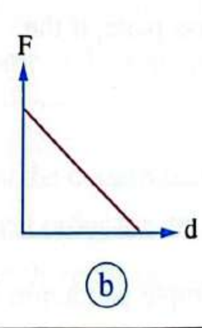
3 Which of the following graphs represents the force (F) required to move a plate of area A in a liquid with a uniform velocity v parallel to another static plate and the distance (d) between the two plates?



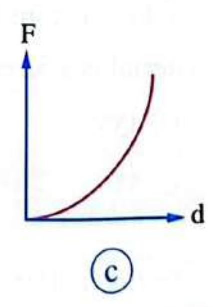
Static plate



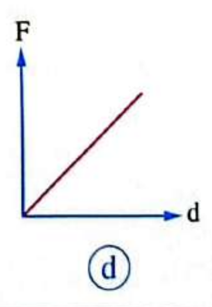
ⓐ



ⓑ



ⓒ

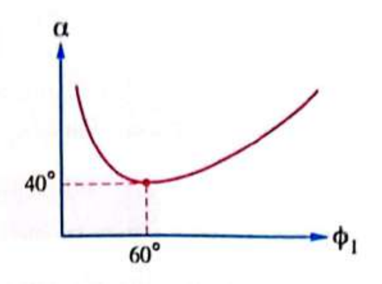


ⓓ

4 A sound wave transfers from air to iron. If the ratio between the speed of sound in air and the speed of sound in iron is $\frac{3}{44}$ while the wavelength of that sound wave in air is 57.6 cm, its wavelength in iron is ....

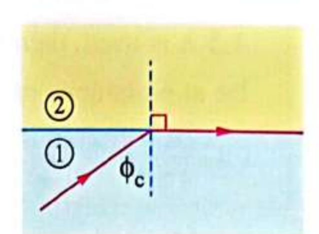
ⓐ 3.9 cm ⓑ 172.8 cm ⓒ 533.5 cm ⓓ 844.8 cm

5 The opposite graph shows the relation between the angle of deviation of a light ray (α) and the angle of incidence (ϕ_1) of this light ray on one of the faces of a triangular prism, then the apex angle of the prism and its refractive index are .... , ... respectively.



(a) 60°, 1.5 (b) 80°, 1.45
(c) 75°, 1.5 (d) 80°, 1.35

6 In the opposite figure, a light ray falls from medium ① on the separating surface between two media ① and ②, therefore the light ray refracts tangent to the separating surface. If the ratio between the speed of light in medium ① and that in medium ② $\left(\frac{v_1}{v_2}\right)$ equals 0.73, the critical angle between the two media equals ....

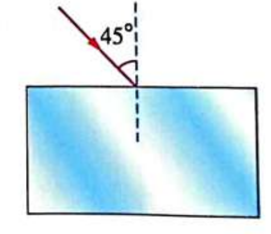


(a) 39.65° (b) 41.8° (c) 46.89° (d) 49.72°

7 The dispersive power of a thin prism depends on ....

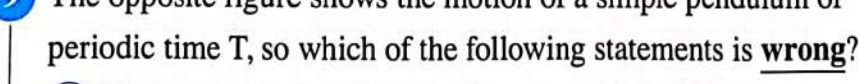
(a) the angle of incidence of the beam on the prism
(b) the intensity of the incident light on the prism
(c) the apex angle of the prism
(d) the refractive index of the prism

8 ✻ The opposite figure shows a light ray that falls from air on a transparent glass plate at angle of 45°, therefore the emergence angle of the light ray from the glass plate, if the refractive index of its material is 1.52 equals ....

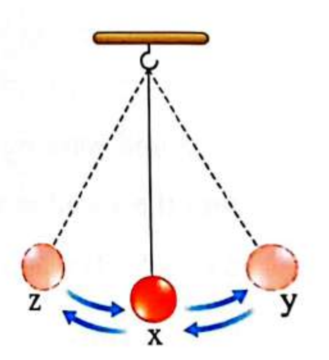


(a) 28° (b) 45°
(c) 49° (d) 53°

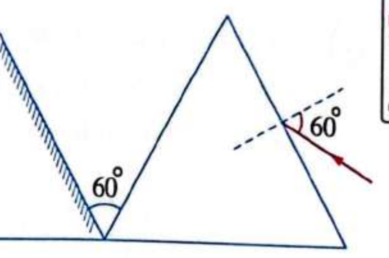
9 The opposite figure shows the motion of a simple pendulum of periodic time T, so which of the following statements is **wrong**?



(a) The speed of the load at x > The speed of the load at y
(b) The speed of the load at z = zero
(c) The amplitude = The distance between z and y
(d) The time taken by the load to cover the distance xy = $\frac{T}{4}$



10 ✻ A light ray falls on one of the faces of equilateral triangular prism of refractive index 1.5 with an angle 60° where the prism makes an angle 60° with a plane mirror as in the opposite figure, therefore the angle of its reflection from the surface of the mirror equals ....

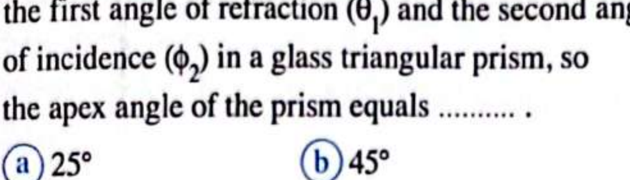


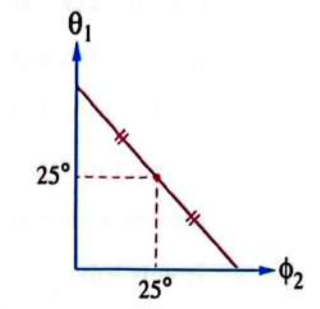
ⓐ 0° ⓑ 21.1° ⓒ 38.9° ⓓ 68.9°

11 A liquid flows steadily in tube x of cross-sectional area 26 cm^2 that is branched into two tubes y and z that have cross-sectional areas of 15 cm^2 and 7 cm^2 respectively. If the speed of the liquid in the tubes x and y are 0.4 m/s and 0.6 m/s respectively, the speed of liquid flow in tube z equals ....

ⓐ 0.2 m/s ⓑ 0.3 m/s ⓒ 0.5 m/s ⓓ 0.7 m/s

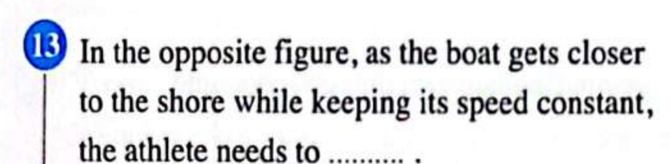
12 The opposite figure represents the relation between the first angle of refraction (θ_1) and the second angle of incidence (ϕ_2) in a glass triangular prism, so the apex angle of the prism equals ....





ⓐ 25° ⓑ 45°
ⓒ 50° ⓓ 60°

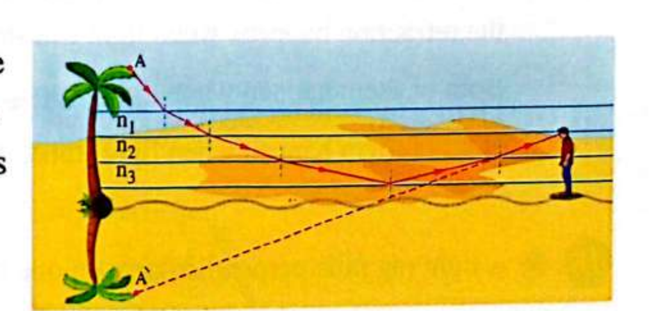
13 In the opposite figure, as the boat gets closer to the shore while keeping its speed constant, the athlete needs to ....



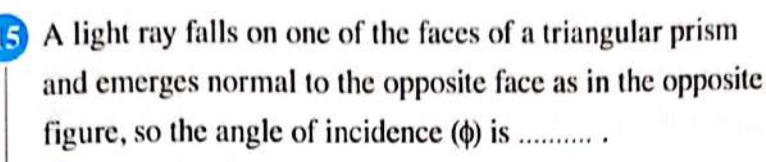


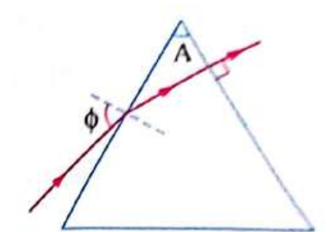
ⓐ row with a less force ⓑ row with a greater force
ⓒ row with the same force ⓓ stop rowing

14 The opposite figure shows the occurrence of mirage, hence the correct order for the wavelengths of light in the three air layers is ....



ⓐ $\lambda_1 > \lambda_2 > \lambda_3$
ⓑ $\lambda_3 > \lambda_2 > \lambda_1$
ⓒ $\lambda_3 > \lambda_1 > \lambda_2$
ⓓ $\lambda_1 = \lambda_2 = \lambda_3$

15 
A light ray falls on one of the faces of a triangular prism and emerges normal to the opposite face as in the opposite figure, so the angle of incidence (ϕ) is ....



(a) greater than A

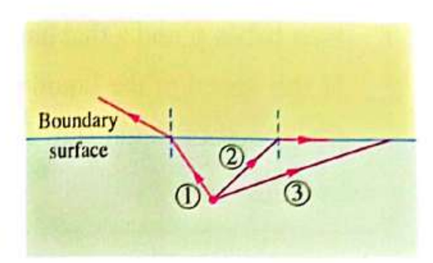
(b) less than A

(c) equal to A

(d) equal to (90 – A)

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16 The opposite figure shows a light source that is placed inside a transparent medium, so what happens to ray ③ at the boundary surface between the two media?



(a) It gets refracted, because the angle of incidence is less than the critical angle between the two media.

(b) It gets refracted, because the angle of incidence is greater than the critical angle between the two media.

(c) It gets totally reflected, because the angle of incidence is less than the critical angle between the two media.

(d) It gets totally reflected, because the angle of incidence is greater than the critical angle between the two media.

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17 Which of the following is correct when comparing between the refraction and the diffraction of light?

(a) The diffraction happens when light transfers from one medium to another while the refraction happens when light propagates in the same medium.

(b) The diffraction happens when light propagates in the same medium while the refraction happens when light transfers from one medium to another.

(c) Both of them happen when light propagates in one medium.

(d) Both of them happen when light transfers from one medium to another.

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18 ✻ A light ray falls perpendicularly on one of the faces of a triangular prism of refractive index $\sqrt{2}$ to emerge tangentially to the opposite face, therefore the angle of minimum deviation of the light ray in the prism equals .... approximately.

(a) 18.5° (b) 20.5° (c) 25.5° (d) 35.5°

19 If a light ray transfers from medium a to medium b where the angle of incidence ϕ is greater than the angle of refraction θ, the relative refractive index $({}_an_b)$ is ....

(a) greater than 1
(b) less than 1
(c) equal to 1
(d) the answer is indeterminable

20 The factor(s) that affect the angle of deviation of the light ray in a triangular prism is (are) ....

(a) the apex angle of the prism
(b) the angle of incidence of the light ray
(c) the refractive index of the prism
(d) all the previous

Second Answer the following questions (21 : 23)

21 If water flows steadily with a speed of 1 m/s inside a tube of diameter 10 cm that ends with a nozzle of diameter 2.5 cm, **calculate** the mass of water that flows every minute through the nozzle of the tube.
(Knowing that: The density of water = 1000 kg/m^3, π = 3.14)

....

....

....

22 "Every vibrational motion is considered a periodic motion, but not every periodic motion is considered a vibrational motion", **show the validity of this sentence.**

....

....

....

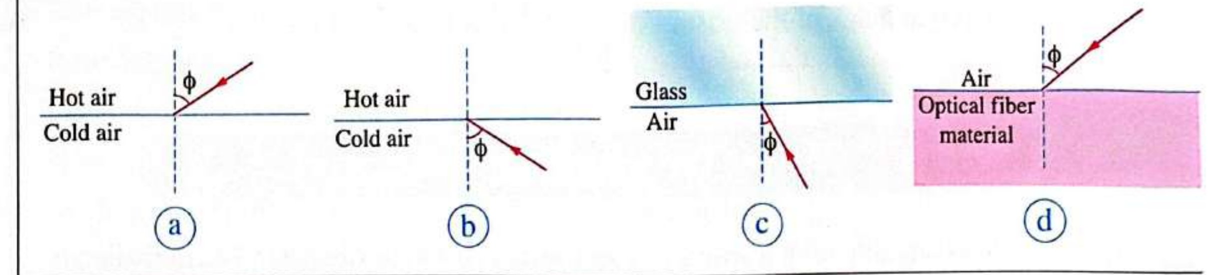
23 In the following figure, **trace the path of** the incident light ray on mirror A till it gets reflected from mirror C.



General Exam 3

First Choose the correct answer (1 : 20)

1 In the following cases a light ray falls on the boundary surface between two media. If angle ϕ is greater than the critical angle between the two media, in which of these cases the light ray suffers a total internal reflection?



2 If the angle of minimum deviation of a light ray that falls on one of the faces of an equilateral triangular prism is 60°, the refractive index of the prism material for the incident light equals ....

(a) $\sqrt{2}$ (b) 1.5 (c) 1.6 (d) $\sqrt{3}$

3 A thin prism has average refractive index of 1.5 and the ratio between the refractive indices of the prism's material for blue and red lights $\left(\frac{n_b}{n_r}\right)$ equals $\frac{23}{20}$, therefore the refractive index of prism's material for blue light (n_b) equals ....

(a) 1.4 (b) 1.5 (c) 1.6 (d) 1.7

4 A light ray falls at an angle ϕ on one of the faces of a triangular prism of apex angle 75° If the refractive index of the prism's material is $\sqrt{2}$ and the light ray emerges tangent to the opposite face of the prism, the value of ϕ is ....

(a) 0° (b) 30° (c) 45° (d) 60°

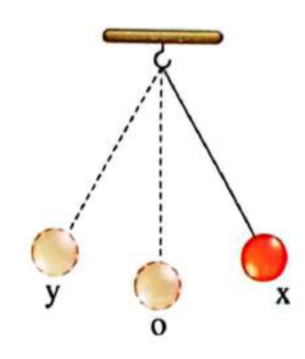
5 A patient is injected by a needle of radius 0.3 mm, if the drug flow in the needle steadily by rate 0.5 cm^3/s, the speed of the drug flow in the needle is .... ($\pi = 3.14$)

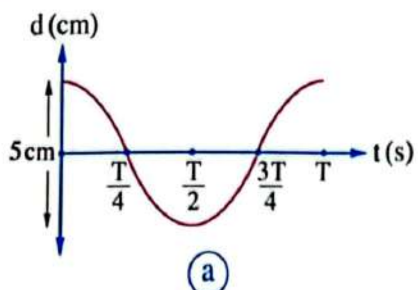
(a) 1.24 m/s (b) 1.77 m/s (c) 2.42 m/s (d) 7.71 m/s

6 If the speed of light in the two media X and Y are 2.4×10^8 m/s and 1.8×10^8 m/s respectively, then the critical angle between the two media is ....

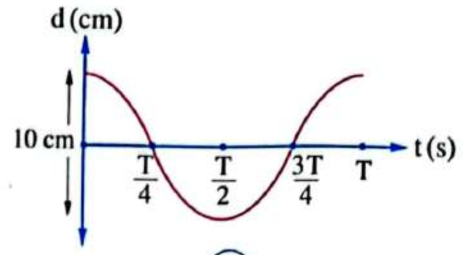
(a) 48.59° in medium X
(b) 48.59° in medium Y
(c) 53.13° in medium X
(d) 53.13° in medium Y

7 In the opposite figure, a simple pendulum has been displaced from its rest position (o) a distance 5 cm to position (x), then it is left to swing making a simple harmonic motion where it completes one oscillation in time T. Which of the following graphs represents the relation between the displacement (d) of the pendulum away from its rest position and the time (t) during that complete oscillation starting from position x?

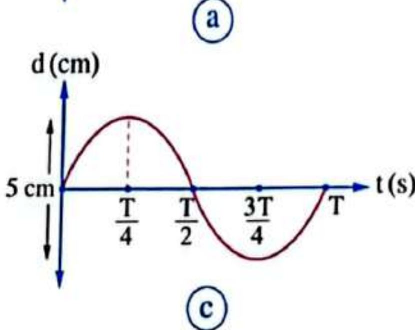




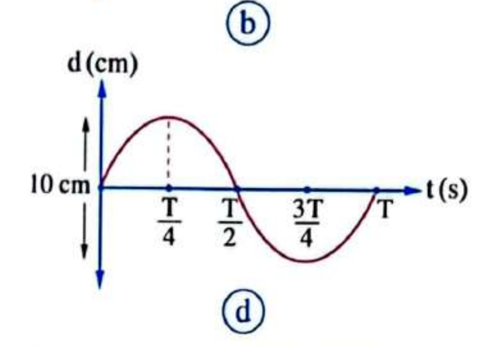
(a)



(b)



(c)



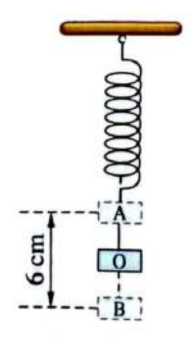
(d)

8 In Young's experiment, if red light was used then the experiment is carried out again with blue light source, the ratio $\left(\frac{(\Delta y)_r}{(\Delta y)_b}\right)$ is ....

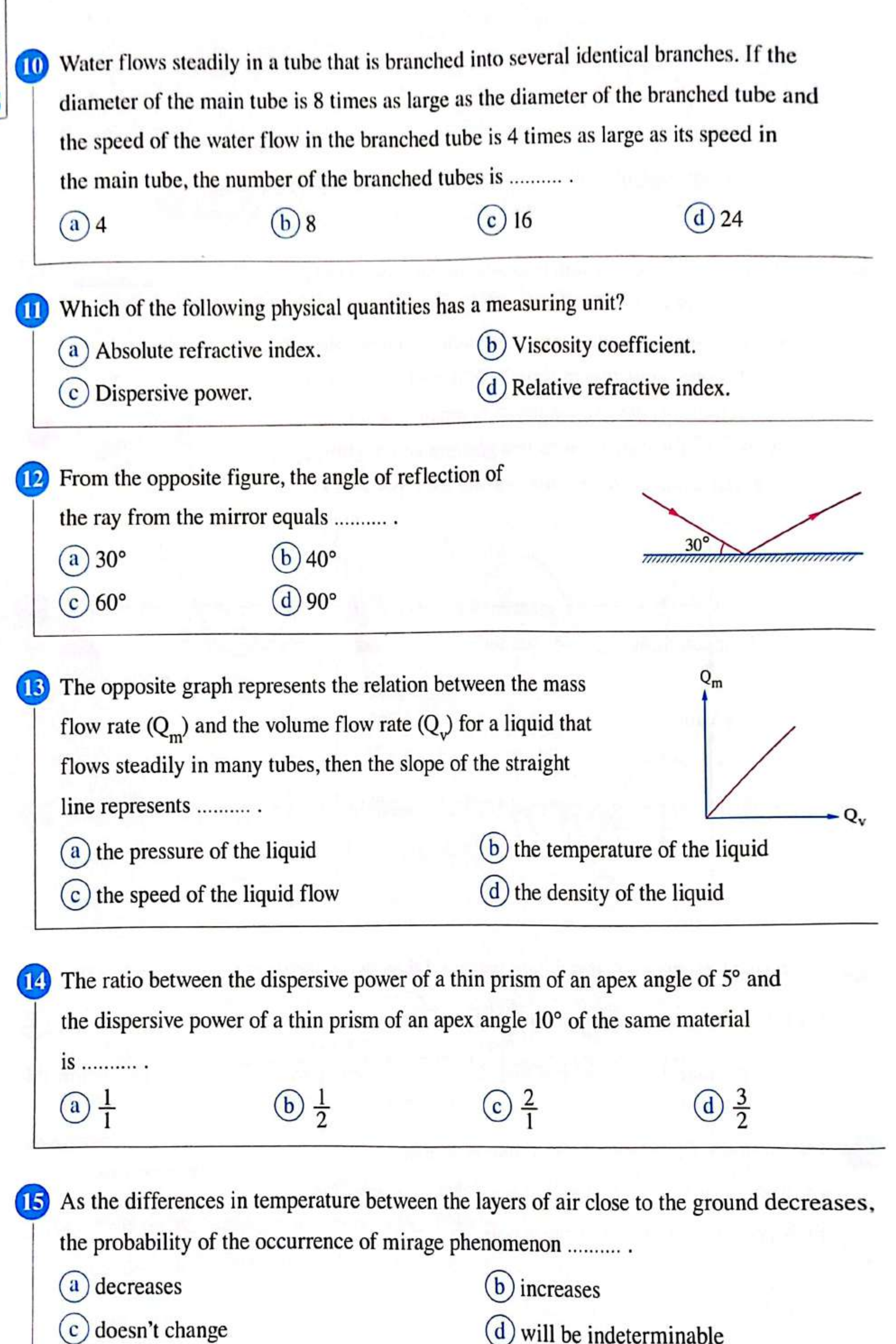


(a) greater than 1
(b) less than 1
(c) equal to 1
(d) indeterminable

9 The opposite figure shows a load that is attached to a vibrating spring, so the total distance that is covered by the load during a periodic time equals ....



(a) 3 cm
(b) 6 cm
(c) 9 cm
(d) 12 cm



10 Water flows steadily in a tube that is branched into several identical branches. If the diameter of the main tube is 8 times as large as the diameter of the branched tube and the speed of the water flow in the branched tube is 4 times as large as its speed in the main tube, the number of the branched tubes is ....

(a) 4 (b) 8 (c) 16 (d) 24

11 Which of the following physical quantities has a measuring unit?

(a) Absolute refractive index.
(b) Viscosity coefficient.
(c) Dispersive power.
(d) Relative refractive index.

12 From the opposite figure, the angle of reflection of the ray from the mirror equals ....

(a) 30° (b) 40°
(c) 60° (d) 90°

13 The opposite graph represents the relation between the mass flow rate (Q_m) and the volume flow rate (Q_v) for a liquid that flows steadily in many tubes, then the slope of the straight line represents ....

(a) the pressure of the liquid
(b) the temperature of the liquid
(c) the speed of the liquid flow
(d) the density of the liquid

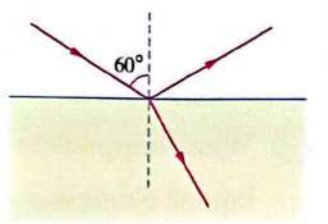
14 The ratio between the dispersive power of a thin prism of an apex angle of 5° and the dispersive power of a thin prism of an apex angle 10° of the same material is ....

(a) $\frac{1}{1}$ (b) $\frac{1}{2}$ (c) $\frac{2}{1}$ (d) $\frac{3}{2}$

15 As the differences in temperature between the layers of air close to the ground decreases, the probability of the occurrence of mirage phenomenon ....

(a) decreases
(b) increases
(c) doesn't change
(d) will be indeterminable

16 A light beam falls from air on the surface of a transparent medium as in the opposite figure. A part of it reflects and another part refracts where the reflected and the refracted rays are perpendicular, then the critical angle of the transparent medium with air equals ....



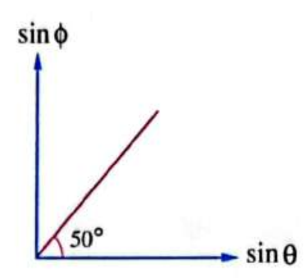
(a) 35.26° (b) 53.26° (c) 45.26° (d) 54.26°

17 If the distance between the first crest and the z crest of a transverse wave is y, the wavelength of the wave equals ....

(a) $\frac{z-1}{y}$ (b) $\frac{y}{1}$ (c) $\frac{z}{y}$ (d) $\frac{y}{z-1}$

18 The opposite graph represents the relation between sine of the angle of incidence (sin ϕ) and sine of the angle of refraction (sin θ) for a light wave when it travels from air to another medium, so the speed of the wave in the medium equals ....

(Knowing that: $c = 3 \times 10^8$ m/s)



(a) 2×10^8 m/s (b) 1.6×10^8 m/s (c) 2.5×10^8 m/s (d) 3×10^8 m/s

19 By increasing the distance between the double-slit barrier and the observation screen in Young's experiment, the ....

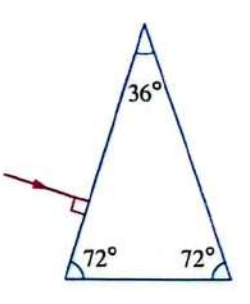
(a) centers of fringes become more distant from each other

(b) centers of fringes become less distant from each other

(c) distances between fringes don't change

(d) number of bright and dark fringes increases

20 The opposite figure represents a triangular prism of refractive index 1.8 where a light ray falls on one of its faces, then the number of total reflections inside the prism equals ....



(a) 1 (b) 2

(c) 3 (d) 4

Second Answer the following questions (21 : 23)

21 **What happens to** the net force affecting a metal object during its fall through a viscous liquid? **Explain.**

....

....

....

....

22 Two sound waves x, y are propagating in the same medium with periodic times T, 2 T respectively, **calculate** the ratio between the wavelengths of the two waves $\left(\frac{\lambda_x}{\lambda_y}\right)$.

....

....

....

23 A light ray falls perpendicularly on one of the faces of a triangular prism of apex angle 35°, so it emerges from the prism deviated from its original path by an angle of 28°

Calculate the refractive index of the prism's material for this light ray.

....

....

....

....

....

....

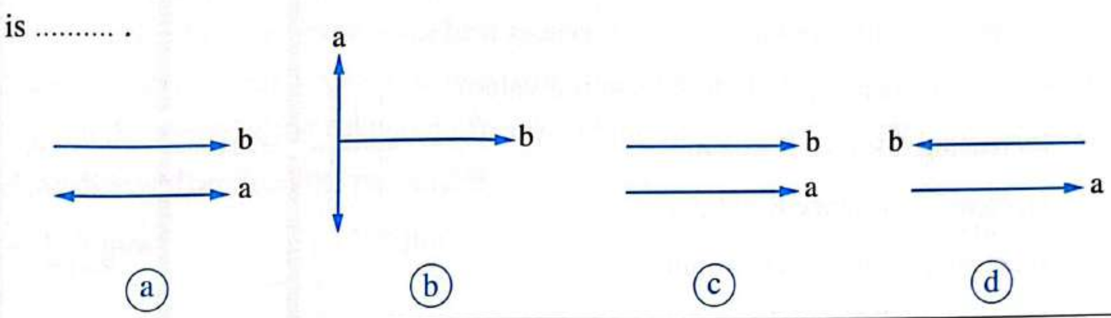
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General Exam 4



First Choose the correct answer (1 : 20)

1. The figure that represents the direction of vibration of the particles of medium (a) relative to the direction of propagation of a transverse wave (b) in this medium is ....



(a) (b) (c) (d)

2. The ratio between the first angle of incidence and the angle of emergence of a light ray, that falls on one of the faces of a triangular prism which is at the minimum deviation position, ...

(a) is greater than 1

(b) is less than 1

(c) is equal to 1

(d) depends on the value of the apex angle of the prism

3. A square plate of side length 10 cm is sliding on another static plate where there is a layer of liquid between them whose coefficient of viscosity is 1.2 $N.s/m^2$. If the upper plate moves with a uniform velocity of 0.2 m/s due to a tangential force of 0.6 N, then the thickness of the liquid layer is ....

(a) 1 mm (b) 2 mm (c) 3 mm (d) 4 mm

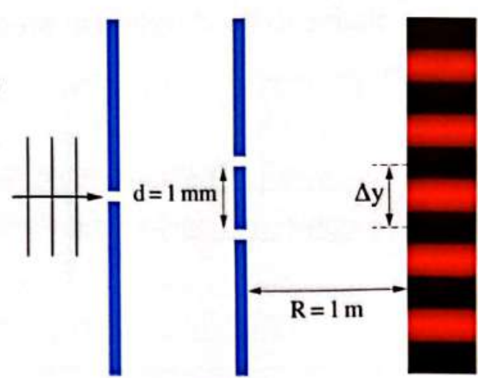
4. Two bodies are vibrating, the first body makes 90 complete vibrations in 2 minutes and the second body makes 3 complete vibrations in one second, so the ratio between their periodic times $(\frac{T_1}{T_2})$ equals ....

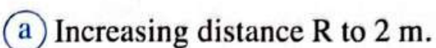
(a) $\frac{1}{2}$ (b) $\frac{2}{1}$ (c) $\frac{1}{4}$ (d) $\frac{4}{1}$

5. At inhalation, the air flows through the trachea with a speed of 15 cm/s. If the cross-sectional area of each of the two branches of the trachea are quarter that of the main trachea and considering the air flow is steady, the speed of the air flow in each branch is ....

(a) 7.5 cm/s (b) 15 cm/s (c) 30 cm/s (d) 45 cm/s

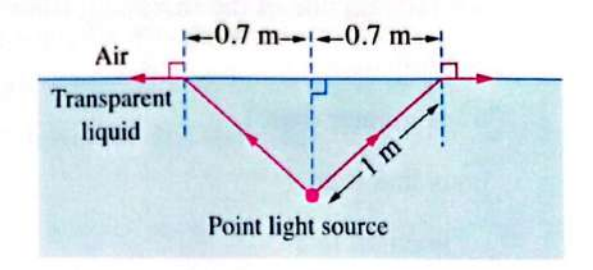
6. The opposite figure represents Young's double-slit experiment, so which of the following choices lead to decreasing the distance Δy to half its initial value?





(a) Increasing distance R to 2 m.
(b) Decreasing distance R to 0.5 m.
(c) Increasing distance d to 4 mm.
(d) Decreasing distance d to 0.5 mm.

7. The opposite figure shows light rays that are produced from a point light source placed inside a transparent liquid. So, the refractive index of this liquid is ....





(a) 1.4 (b) 1.7
(c) 1.8 (d) 2

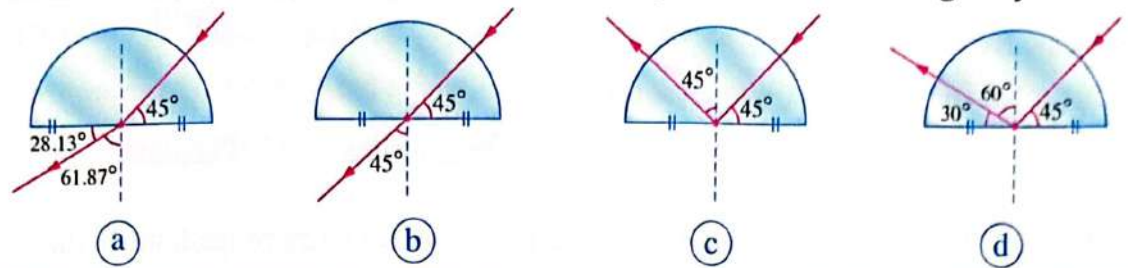
8. When the school's bell rings, its sound reaches the ears of students in the form of .... waves.

(a) longitudinal (b) transverse
(c) longitudinal and transverse (d) electromagnetic

9. A thin prism is submerged in water where it deviates the light rays that fall on it from the water by an angle of 0.9°. If the refractive index of the prism's material is 1.5 and the refractive index of water is 1.33, the apex angle of the prism is .... approximately.

(a) 8° (b) 7° (c) 6° (d) 5°

10 A light ray is incident on a semi-circular glass prism whose refractive index is 1.5, which of the following diagrams represents the correct path for the incident light ray?



11 In the double-slit experiment, a student used laser rays of wavelength 632.8 nm and he placed the observation screen 1 m away from the double-slit. He finds that the distance between the center of the first bright fringe and the center of the central fringe is 3.2 mm, so the distance between the two slits is ....

(a) 19.8 mm (b) 198 μm (c) 50.6 mm (d) 506 μm

12 The following measuring units are equivalent to each other **except** ....

(a) $kg.m^2/s^2$ (b) $N.s/m^2$ (c) $J.s/m^3$ (d) kg/m.s

13 Firemen use water hoses of narrow nozzles when they extinguish fire because the rushing speed of ....

(a) water increases by decreasing the cross-sectional area of the nozzle
(b) water decreases by decreasing the cross-sectional area of the nozzle
(c) water increases by increasing the cross-sectional area of the nozzle
(d) water is constant whatever the cross-sectional area of the nozzle changes

14 An optical fiber that has a material of refractive index 2.1 is coated by an external layer, so the refractive index of the external layer that makes the critical angle between the two layers equal 32° is ....

(a) 1.11 (b) 1.9 (c) 3.96 (d) 4.32

15 A light ray falls on one of the faces of a triangular prism with an angle of incidence 60°. If the apex angle of the prism is 30° and its refractive index is $\sqrt{3}$, the light ray ....

(a) emerges tangent to the opposite face
(b) totally reflects and doesn't emerge at the opposite face
(c) emerges normal to the opposite face
(d) changes its path by 90°

16 A thin prism of apex angle 8°, dispersive power of its material is 0.037 and the refractive index of its material for the yellow color is 1.54, therefore the angular dispersion of light in it equals ....

(a) 0.11° (b) 0.12° (c) 0.14° (d) 0.16°

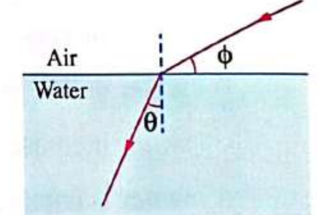
17 If the refractive index of medium A is double the refractive index of medium B, the ratio between the speed of the light in medium A and the speed of the light in medium B equals ....

(a) $\frac{1}{2}$ (b) $\frac{2}{1}$ (c) $\frac{1}{4}$ (d) $\frac{4}{1}$

18 Light rays fall on two thin prisms, the apex angle of the first prism is double the apex angle of the second prism and the refractive index of the first prism is 1.5 while the refractive index of the second prism is 1.2. So, the ratio between the angle of deviation of the first prism and the angle of deviation of the second prism respectively equals ....

(a) $\frac{10}{1}$ (b) $\frac{20}{1}$ (c) $\frac{5}{1}$ (d) $\frac{1}{2}$

19 The opposite figure represents a light ray that transfers from air to water of refractive index $\frac{4}{3}$, so the relation that represents the refraction in this case is ....



(a) $\frac{\sin \phi}{\sin \theta} = \frac{4}{3}$ (b) $\frac{\sin \theta}{\sin \phi} = \frac{4}{3}$

(c) $\frac{\sin (90 - \phi)}{\sin \theta} = \frac{4}{3}$ (d) $\frac{\sin (90 - \phi)}{\sin (90 - \theta)} = \frac{4}{3}$

20 In the diffraction phenomenon, the waves path changes when they ....

(a) transfer from a medium to another

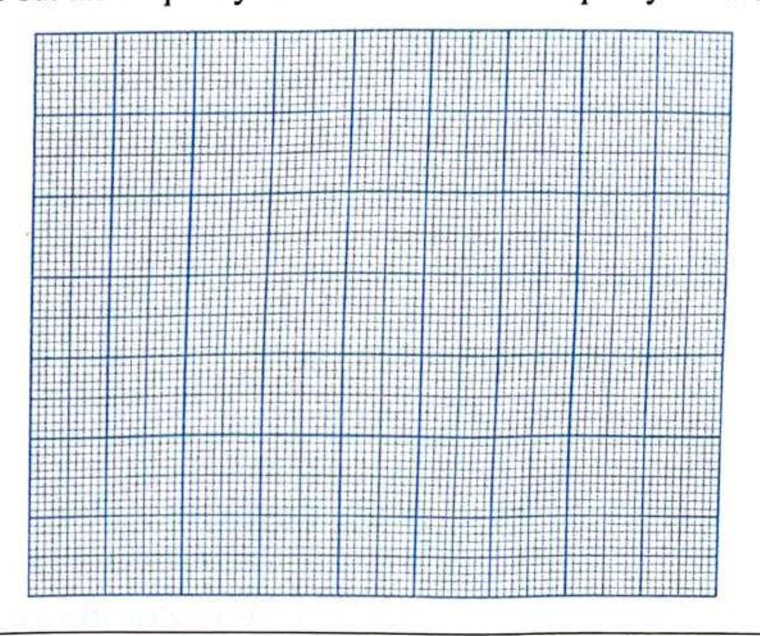
(b) fall on a reflecting surface

(c) encounter a sharp edge

(d) collide with another wave

Second Answer the following questions (21 : 23)

21 **Draw** on the following graph paper the sine curve (displacement-time) that represents two waves of the same kind A and B that propagate in the same medium and have the same amplitude but the frequency of wave A is half the frequency of wave B.



22 An empty tank gets filled with an amount of kerosene of mass 100 kg using a hose where the kerosene emerges from its nozzle with a speed of 0.2 m/s, so if the tank is filled during 25 minutes, **calculate** the radius of the hose nozzle.

(Knowing that: Density of kerosene = 900 kg/m^3, $\pi = 3.14$)

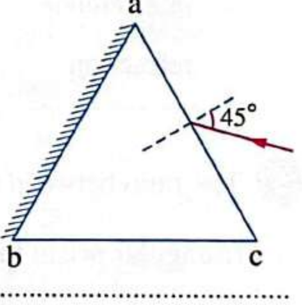
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....

....

23 The opposite figure represents a light ray that falls with an angle of 45° on the face (ac) of an equilateral triangular prism that has a material of refractive index $\sqrt{2}$ and its external face (ab) is silvered by a reflecting layer. **Trace** the light ray till its emergence from the prism.



....

....

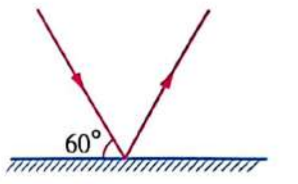
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General Exam 5



First Choose the correct answer (1 : 20)

1 In the opposite figure, the angle of reflection of the light ray from the mirror equals ....



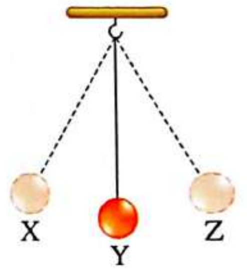


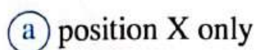
(a) 30° (b) 45°



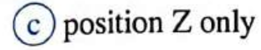
(c) 60° (d) 120°

2 During the vibration of the pendulum shown in the opposite figure, the velocity of the pendulum load equals zero at ....





(a) position X only (b) position Y only



(c) position Z only (d) positions X and Z

3 The adjacent fringe to the central fringe in Young's double-slit experiment is ....

(a) always bright

(b) always dark

(c) determined by the medium

(d) determined by the wavelength of the used light

4 The bottom of a swimming pool may not be seen when looking at it from the air, because of the .... of the light.

(a) interference (b) diffraction

(c) refraction (d) total internal reflection

5 The ratio between the first refraction angle and the second angle of incidence in a triangular prism that is set at the minimum deviation position $(\frac{\theta_1}{\phi_2})$ is ....

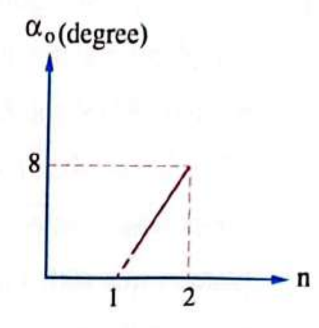
(a) greater than one (b) less than one

(c) equal to one (d) indeterminable

6 If the refractive index of diamond is 2.4, the maximum angle of incidence of a light ray that falls inside the diamond to emerge to the air equals ....

(a) 40.2° (b) 36.2° (c) 32.4° (d) 24.6°

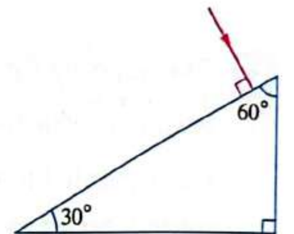
7 The opposite graph shows the relation between the angle of deviation (α_o) of light for several thin prisms that have the same apex angle and the refractive index (n) of the material of these prisms, then the apex angle of any one of them equals ....



(a) 4° (b) 6°

(c) 8° (d) 10°

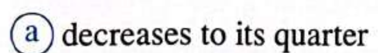
8 The opposite figure represents a light ray that falls normally on one of the faces of a triangular prism of refractive index 1.5, so its emergence angle from the prism equals ....



(a) 30° (b) 41.81°

(c) 48.59° (d) 60°

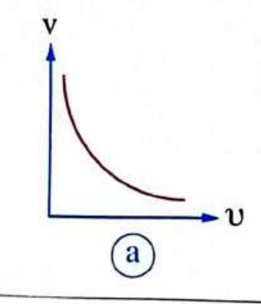
9 A tangential force acts on a wooden plate to slide on a layer of liquid that covers the ground of a hall. If this force is doubled, the viscosity coefficient of the liquid ....



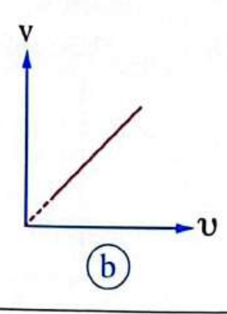
(a) decreases to its quarter (b) decreases to its half

(c) increases to the double (d) doesn't change

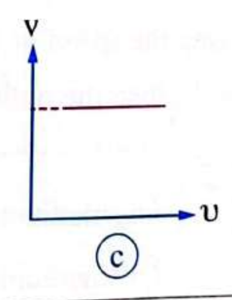
10 Which of the following graphs represents the relation between the speed of propagation for different sound waves (v) in air and the frequency (υ) for each of them?



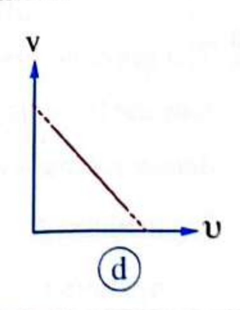
(a)



(b)



(c)

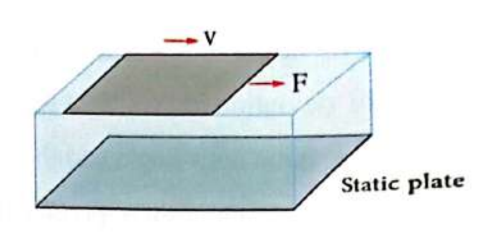


(d)

11 A triangular prism of apex angle 45° and refractive index 1.6 is set at the minimum deviation position, so the angle of incidence of the light ray equals ....

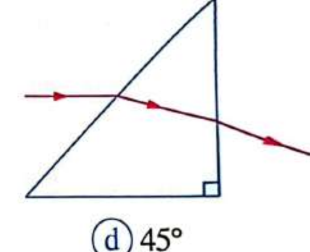
ⓐ 13.8° ⓑ 17.3° ⓒ 30.5° ⓓ 37.8°

12 In the opposite figure, when liquid A is placed between two plates and the upper plate is affected by a tangential force of 100 N, the plate moves with a uniform speed of 0.2 m/s and when replacing liquid A by liquid B and the upper plate is affected by a tangential force of 50 N, the plate moves with a uniform speed 0.4 m/s, then the ratio between the viscosity coefficients of the two liquids $\left(\frac{(\eta_{vs})_A}{(\eta_{vs})_B}\right)$ is ....



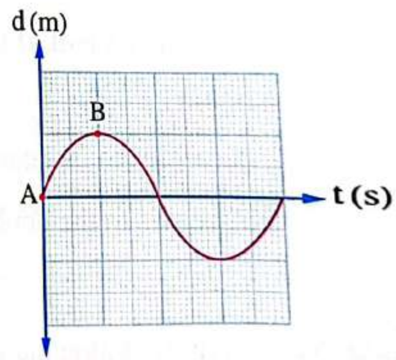
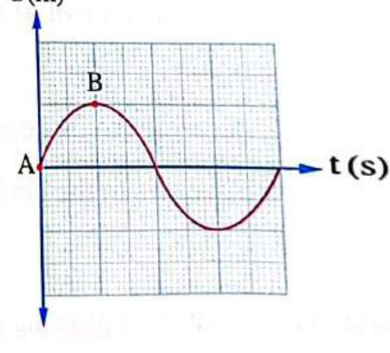
ⓐ $\frac{1}{1}$ ⓑ $\frac{1}{2}$ ⓒ $\frac{2}{1}$ ⓓ $\frac{4}{1}$

13 The opposite figure shows an isosceles right angle triangular prism of refractive index 1.5. If a light ray falls on one of its faces parallel to the base, it emerges from the opposite face with an angle of emergence that equals ....



ⓐ 16.87° ⓑ 25.8° ⓒ 28.1° ⓓ 45°

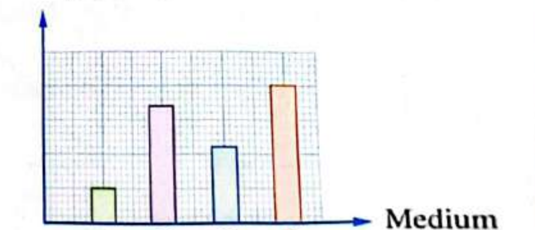
14 The opposite graph shows the relation between the vertical displacement of the motion of a medium particle (d) and the time (t) of a wave. If the time interval between A and B is 0.15 s, the frequency of the wave equals ....

ⓐ $\frac{1}{15}$ Hz ⓑ $\frac{1}{3}$ Hz

ⓒ $\frac{5}{3}$ Hz ⓓ $\frac{20}{3}$ Hz

15 The opposite graph shows the speed of light in four media A, B, C and D, then the optically denser medium is ....



ⓐ medium A ⓑ medium B

ⓒ medium C ⓓ medium D

16 A thin prism whose material refractive index for yellow light is 1.5, therefore the refractive indices of the prism's material for red and blue lights are .... respectively.

(a) 1.3, 1.4 (b) 1.6, 1.7 (c) 1.4, 1.6 (d) 1.3, 1.6

17 ✻ Three students A, B, C carried out Young's double-slit experiment using a red laser beam and the following table shows the distances between the parts of the experiment that is carried out by each one of them:

	Student (A)	Student (B)	Student (C)
The separating distance between the two slits	0.15 mm	0.175 mm	0.15 mm
The distance between the observation screen and the double slit	0.6 m	0.8 m	0.8 m

Therefore, the arrangement of the three students according to the resolution of interference that is obtained in the experiments is ....

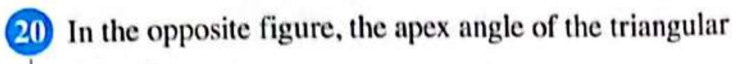
(a) C < A < B (b) B < A < C (c) C < B < A (d) A < B < C

18 A large tube of diameter 30 cm is branched into a number of narrow tubes each of radius 30 mm. If the speed of the water passing in the wide tube equals the speed of the water in the narrow tube, then the number of the narrow tubes equals ....

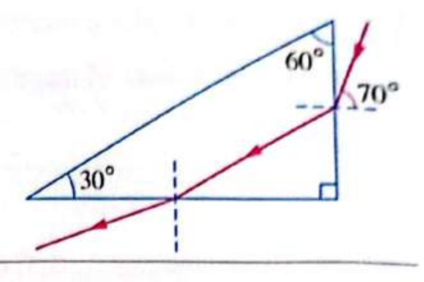
(a) 25 (b) 50 (c) 75 (d) 100

19 Bright fringes and dark fringes are produced in each of interference and diffraction phenomena of light. Does the distance between the centers of two successive fringes of the same type differ in each of the two phenomena?

	Interference phenomenon	Diffraction phenomenon
(a)	Differs	Differs
(b)	Differs	Doesn't differ
(c)	Doesn't differ	Differs
(d)	Doesn't differ	Doesn't differ



20 In the opposite figure, the apex angle of the triangular prism is ....



(a) 30° (b) 60°

(c) 70° (d) 90°

Second — Answer the following questions (21 : 23)

21 **Explain why** firemen use hoses with narrow nozzles as in the opposite figure when they extinguish fires.
And what happens if hoses of wider nozzles are used?



....

....

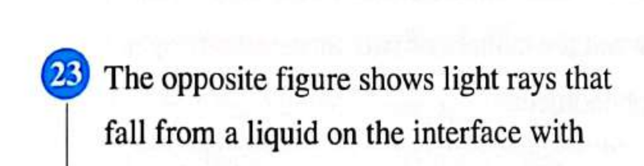
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22 A wave travels between two different media (1), (2) where its wavelength in one medium is larger than its wavelength in the other medium by 10 cm. If the ratio between the speeds of the wave in the two media is $\left(\frac{v_1}{v_2} = \frac{2}{3}\right)$, **calculate** the wavelength of the wave in medium (1).

....

....

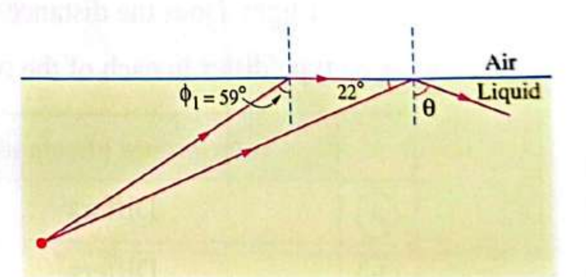
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23 The opposite figure shows light rays that fall from a liquid on the interface with air, **calculate:**

(a) The value of angle θ.

(b) The absolute refractive index of the liquid.



....

....

....

....

Exam 6




Cairo Governorate
East Nasr City Directorate

First Choose the correct answer (1 : 20) — *1 Mark for each*

1 Two sound waves (a) and (b), whose frequencies are 512 Hz and 1024 Hz respectively, propagate in a certain medium, so the ratio between their speeds $\left(\frac{V_a}{V_b}\right)$ is ....

(a) $\frac{3}{1}$ (b) $\frac{1}{1}$ (c) $\frac{2}{1}$ (d) $\frac{1}{2}$

2 A vibrating body has periodic time $\frac{1}{6}$ second, so its frequency is .... Hz.

(a) 6 (b) 3 (c) $\frac{1}{3}$ (d) $\frac{1}{6}$

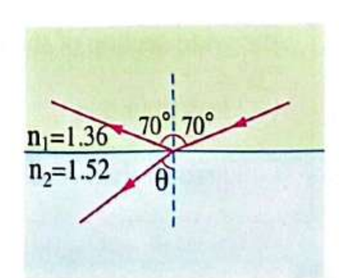
3 If the time interval between the first crest and the eleventh crest of a wave motion is 0.15 s and the distance between two successive crests is 4.5 m, the speed of wave propagation is equal to .... m/s.

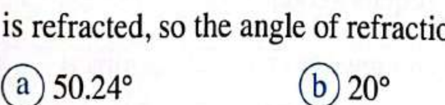
(a) 100 (b) 200 (c) 300 (d) 400

4 The laser beam reaches the surface of the moon because it is ....

(a) a mechanical wave that does not need a medium for propagation
(b) an electromagnetic wave that does not need a medium for propagation
(c) a mechanical wave that needs a medium for propagation
(d) an electromagnetic wave that needs a medium for propagation

5 In the opposite figure, a light ray falls on a separating surface, a part of it is reflected and the remaining part is refracted, so the angle of refraction is ....





(a) 50.24° (b) 20°
(c) 39.87° (d) 57.22°

6 A thin prism of apex angle 6° has a refractive index 1.5, so the angle of deviation through it is ....

(a) 3° (b) 6° (c) 8° (d) 4°

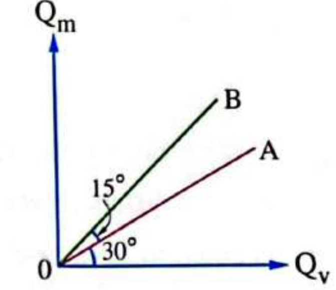
7 In optical fibers, the optical density of the outer layer is .... the optical density of the inner layer.

(a) greater than
(b) equal to
(c) smaller than
(d) greater than or equal to

8 A liquid layer of thickness 4.5 mm and viscosity coefficient 1.8 kg/m.s is placed between two horizontal and parallel plane plates. If a force of 32 N is applied tangential to the upper plate, it gets moving at speed of 1 m/s, then the area of the upper plate is .... m^2.

(a) 0.02
(b) 0.06
(c) 0.04
(d) 0.08

9 Two liquids A and B flow steadily through two identical tubes, if the relationship between mass flow rate (Q_m) and volume flow rate (Q_v) is represented in the opposite graph, the ratio $\left(\frac{\rho_B}{\rho_A}\right)$ is ....



(a) $\sqrt{2}$
(b) $\frac{2}{1}$
(c) $\frac{1}{2}$
(d) $\sqrt{3}$

10 When the tangential force acting on a plate of area 10 m^2 placed on a liquid surface is doubled, the viscosity coefficient ....

(a) remains constant
(b) decreases to half
(c) doubled
(d) decreases by a quarter

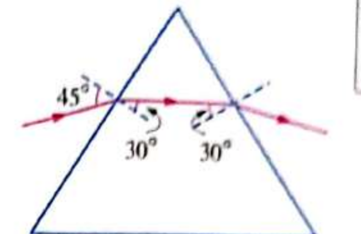
11 In the steady flow of a liquid through a tube, the ratio between the number of streamlines in the wide section of the tube and their number in the narrow section is ....

(a) less than one
(b) equal to one
(c) greater than one
(d) no answer can be determined

12 Two thin prisms made of the same material. If the ratio between their apex angles is $\frac{2}{6}$, the ratio between their dispersive powers respectively is ....

(a) $\frac{4}{1}$
(b) $\frac{6}{2}$
(c) $\frac{2}{6}$
(d) $\frac{1}{1}$

13 The opposite figure shows a light ray passing through an equilateral triangular prism of refractive index $\sqrt{2}$, so the angle of deviation of the light ray equals ....

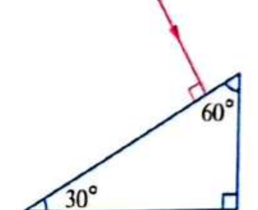


(a) 30° (b) 40°
(c) 45° (d) 60°

14 The fringe consecutive to the central fringe in Young's double-slit experiment is ....

(a) always bright
(b) always dark
(c) determined by the type of medium
(d) determined by the wavelength of light used

15 The opposite figure shows a light ray falling normal on one of the faces of a triangular prism of refractive index 1.5, so the angle of emergence is ....



(a) 30° (b) 48.59°
(c) 41.8° (d) 60°

16 When a light ray falls on one of the faces of an equilateral triangular prism at the position of the minimum deviation, the angle of incidence inside the prism is equal to ....

(a) 30° (b) 45° (c) 60° (d) 90°

17 The largest angle of refraction for a light ray falling from glass to air is ....

(a) 180° (b) 90° (c) 45° (d) 60°

18 A man noticed that the pen appears broken in the water, this was due to ....

(a) the equality in the speed of light in the two media
(b) the difference in the frequency of light through the two media
(c) the difference in light intensity through the two media
(d) the difference in optical density through the two media

19 It is difficult to notice the diffraction of light in our daily life because ....

(a) the speed of visible light is high
(b) the wavelength of visible light is short
(c) the intensity of visible light is high
(d) the frequency of visible light is small

20 An optical fiber of refractive index 2.1 is coated with an outer layer, so the refractive index of the outer layer material for making the critical angle between the two layers 32° is ....

(a) 4.32
(b) 1.9
(c) 3.96
(d) 1.11

Second — Answer the following questions (21 : 23)

21 The opposite figure shows a transverse wave.

Find the wavelength and frequency. *(1 Mark)*

....

....

....

....

d(cm)
35 cm
t(ms)
3 6 9 12

22 When a firefighter uses a fire hose, he finds that the water does not reach the fire site quickly enough. **What do you suggest** to increase the speed of water flowing from the hose? **Explain your answer**. *(1 Mark)*

....

....

....

23 **In the opposite figure:**

If the absolute refractive index of the prism material is 1.5.

(a) **Trace** the path of the ray by drawing.

(b) **Determine** the angle of emergence. *(2 Marks)*

(1)
45°
45°

....

....

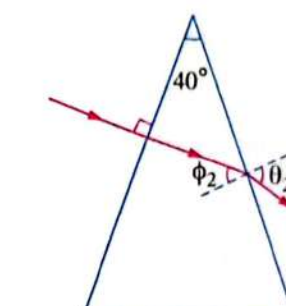
Exam 7

Giza Governorate
Awseem Directorate



First Choose the correct answer (1 : 20) *1 Mark for each*

1. The opposite figure shows a light ray incident normal on one of the faces of a triangular prism with apex angle 40°, if refractive index of the prism is 1.35, the angle of emergence (θ_2) is approximately ....



ⓐ 60° ⓑ 40°
ⓒ 80° ⓓ 50°

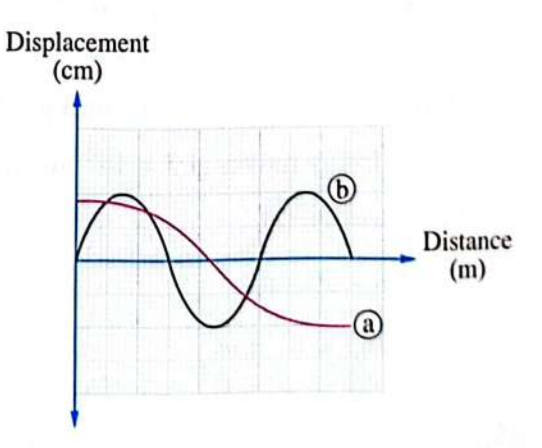
2. Two thin prisms are inverted to each other such that one of them cancels the deviation caused by the other. The apex of the first prism is 8° and its refractive index is 1.5. If the apex angle of the second prism is 6°, its refractive index equals ....

ⓐ 1.08 ⓑ 1.125 ⓒ 1.67 ⓓ 2.22

3. A thin prism of apex angle 8° has a refractive index 1.52 for red light and 1.54 for blue light, so the dispersive power of the prism is ....

ⓐ 0.038 ⓑ 0.015 ⓒ 0.024 ⓓ 0.044

4. The opposite figure represents the relation between the vertical displacement and the distance travelled by two transverse waves ⓐ and ⓑ, so the ratio between the wavelengths $\left(\frac{\lambda_a}{\lambda_b}\right)$ ....



ⓐ $\frac{3}{1}$ ⓑ $\frac{3}{4}$
ⓒ $\frac{1}{1}$ ⓓ $\frac{1}{3}$

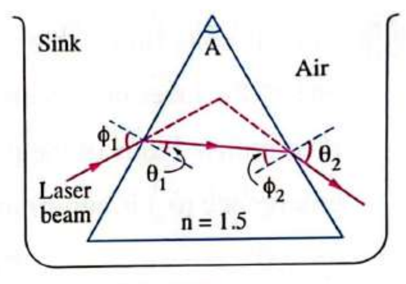
5. If a light ray falls perpendicular on a glass cube, which of the following **don't** change?

ⓐ Direction and frequency. ⓑ Direction and velocity.
ⓒ Frequency and velocity. ⓓ Velocity and wavelength.

6 A circular plate of radius 7 cm slides at uniform speed of 0.1 m/s on a ceramic floor covered by a layer of viscous liquid of thickness 2.5 mm and viscosity coefficient of 2.5 N.s/m^2, then the tangential force that acting on the plate is ....

(a) 1.54 N (b) 1.32 N (c) 1.24 N (d) 1.12 N

7 A triangular prism of refractive index 1.5 is put inside an empty sink where a laser beam is incident on the prism and emerges as shown in the figure, if a water of refractive index 1.3 is poured in the sink till it has covered the prism, what happens to the angles (θ_1) and (θ_2)?



(a) Both will increase.
(b) Both will decrease.
(c) θ_1 will increase and θ_2 will decrease.
(d) θ_1 will decrease and θ_2 will increase.

8 A light ray falls normally on one of the faces of a triangular prism with apex angle 30° If the refractive index of the prism is $\sqrt{2}$, the angle of deviation of the light ray is ....

(a) 15° (b) 30° (c) 45° (d) 60°

9 In Young's experiment, the wavelength of the used light is 5000 Å and the distance between the central fringe and the fourth bright fringe is 0.8 cm, if another light of wavelength 7000 Å is used, the distance between two successive bright fringes will be ....

(a) 0.8 cm (b) 0.28 cm (c) 1.12 cm (d) 0.7 cm

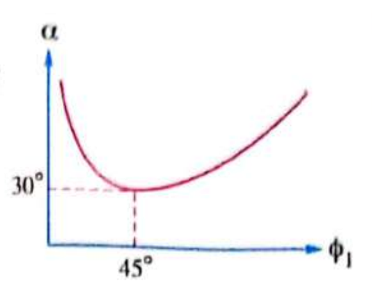
10 A light ray passes from air into a different material that has a refractive index of 1.6, the light ray moves at 3×10^8 m/s in air. At what speed does the light ray move in the material?

(a) 4.8×10^7 m/s
(b) 1.875×10^8 m/s
(c) 1.785×10^7 m/s
(d) 1.857×10^8 m/s

11 A piece of diamond is placed at the bottom of a wide basin filled with water till a height of 1 m, so the smallest diameter of a cork disc that while floating on the water surface will be enough to block the reflected rays by the diamond from emerging out from the water surface will be .... (Giving that: The refractive index of the water is 1.33)

(a) 2.28 m (b) 1.14 m (c) 3.2 m (d) 2.9 m

12 The opposite figure represents the relation between the first angle of incidence of a light ray on glass prism and the angle of deviation, then the refractive index of the prism is ....



ⓐ $\sqrt{2}$ ⓑ $\frac{\sqrt{3}}{2}$

ⓒ $\frac{1}{\sqrt{2}}$ ⓓ 1

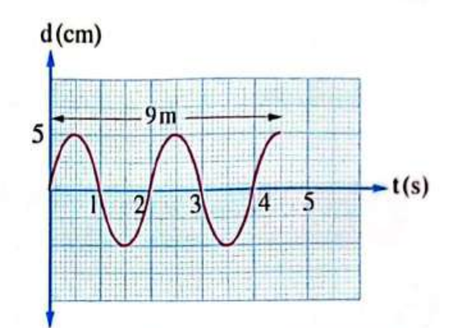
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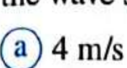
13 A liquid flows steadily in tube x of cross-sectional area 26 cm^2 that's branched into two tubes y and z with cross-sectional areas 15 cm^2 and 7 cm^2 respectively, if the speeds in tubes x and y are 0.4 m/s and 0.6 m/s respectively, the speed in the tube z is ....

ⓐ 0.2 m/s ⓑ 0.3 m/s ⓒ 0.5 m/s ⓓ 0.7 m/s

---

14 The opposite figure represents the motion of a transverse wave and illustrates the relation between the displacement and the time, so the wave speed equals ....





ⓐ 4 m/s ⓑ 2 m/s

ⓒ 9 m/s ⓓ 6 m/s

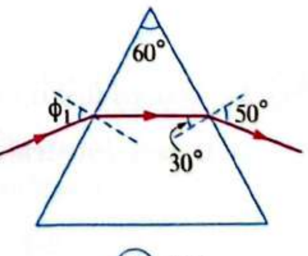
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15 In the double-slit experiment, if the distance between the two narrow rectangular slits was 0.15 mm and the distance between the double-slit and the observation screen is 75 cm so that the distance between two successive bright fringes was 0.3 cm, the wavelength of the used light is ....

ⓐ 6×10^{-4} mm ⓑ 6×10^{-2} µm ⓒ 9×10^{-5} mm ⓓ 9×10^{-2} µm

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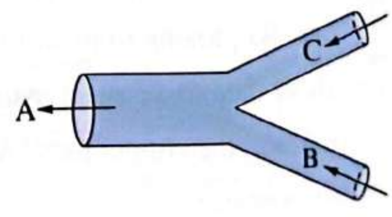
16 From the opposite figure, a light ray falls on one of the faces of a triangular prism with apex angle 60°, so the angle of deviation of the light ray is ....



ⓐ 40° ⓑ 50° ⓒ 41° ⓓ 53°

---

17 The opposite diagram shows a steady flow of a liquid in a tube. If the volume flow rate in the branches B and C are 0.1 m^3/s and 0.3 m^3/s respectively, the volume flow rate in the tube A is ....



ⓐ 0.1 m^3/s ⓑ 0.2 m^3/s ⓒ 0.3 m^3/s ⓓ 0.4 m^3/s

18 A light ray falls from glass on the boundary surface with air at an angle of incidence equal to the critical angle, so it gets refracted tangent to the boundary surface, if a layer of water is placed on the glass surface, the angle of emergence of the ray to the air equals .... (Given that: The refractive index of the glass is 1.5 and of water is $\frac{4}{3}$)

(a) 42° (b) 48° (c) 62° (d) 90°

19 The ratio between the refractive index of the prism material for the violet light and the refractive index of the material of the same prism for the red light $\left(\frac{n_v}{n_r}\right)$ is ....

(a) greater than one (b) less than one (c) equal to one (d) indeterminable

20 If the distance between the first and the seventh crests is 120 cm in a transverse wave, the wavelength of this wave is ....

(a) 20 m (b) 17.14 m (c) 0.2 m (d) 12 m

Second Answer the following questions (21 : 24) *1 Mark for each*

21 Although we can see the sunlight, we can't hear the sound of the nuclear explosions inside it. **Discuss the reason.**

....

22 In the same triangular prism, the minimum angle of deviation (α_o) differs according to the wavelength of used light. **Explain.**

....

23 It's noticed that the most of aquatic plants are found at the sides of the river streams not at its axis. **Illustrate this sentence.**

....

24 The opposite figure represents a light ray (R) passing from air through a glass sheet then to air again, **which** of the paths is the correct path? **And why?**

....

Exam 8

Alexandria Governorate
Physics Inspection



First — Choose the correct answer (1 : 20) — *1 Mark for each*

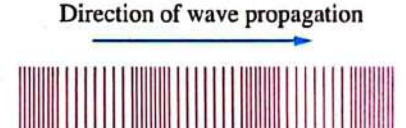
1 Light travels from space to a medium where its velocity decreases by $\frac{1}{3}$ its value, so the absolute refractive index of this medium is ....

(a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{3}{2}$ (d) $\frac{1}{2}$

2 The ratio between the width of the central bright fringe in Young's double-slit experiment when using red light and its width when using violet light with holding the other factors constant is ....

(a) greater than one (b) less than one (c) equal to one (d) indeterminable

3 The opposite figure represents a longitudinal wave, then the ratio between the two distances $\left(\frac{X_{ac}}{X_{de}}\right)$ is ....



(a) 1 : 2 (b) 1 : 3

(c) 2 : 1 (d) 3 : 1

4 When a wave travels from a medium to another medium, the frequency of the wave ....

(a) decreases (b) increases

(c) remains constant (d) decreases to half

5 Which of the following correctly describes what is meant by a medium of wave travel?

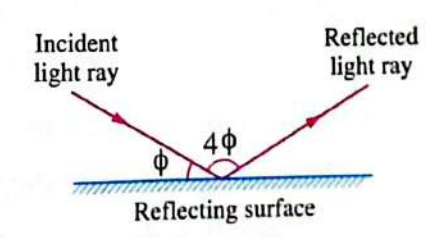
(a) A medium of wave travel is the midpoint of a travelling wave.

(b) A medium of wave travel is a substance through which a wave travel.

(c) A medium of wave travel is average amplitude of travelling wave.

(d) A medium of wave travel is the average speed in which the wave travel.

6 In the opposite figure, the angle of reflection = ...



(a) 30° (b) 45°

(c) 60° (d) 90°

7 When light wave falls on different apertures of different sizes, it is expected that the diffraction of light will be most observable if the aperture size is ....

(a) 1 m (b) 10^{-2} m (c) 10^{-3} m (d) 10^{-5} m

8 The wavelengths of the light ray in two media x and y are 5500 Å and 4000 Å respectively, then the critical angle between the two media = ...

(a) 11.43° (b) 46.66° (c) 56.66° (d) 89.46°

9 If the refractive index of glass is $\sqrt{2}$, the biggest angle of incidence in the glass at the boundary surface that lets the light ray emerge from the glass to air and doesn't suffer total internal reflection = ...

(a) 30° (b) 45° (c) 60° (d) 75°

10 Which light color has the least value of critical angle in glass surrounded by air?

(a) Red (b) Green (c) Yellow (d) Violet

11 An equilateral prism is at minimum deviation position, if the angle of deviation = 30°, the angle of incidence = ...

(a) 30° (b) 45° (c) 60° (d) 90°

12 A thin prism its apex angle is 10°, its refractive index for red light is 1.5 and for blue light is 1.6, so its angular dispersion = ...

(a) 1.5° (b) 1.6° (c) 10° (d) 1°

13 A triangular prism whose apex angle is 30° and refractive index is $\sqrt{3}$, if the light emerges normally from the other face, the angle of incidence = ...

(a) 16.77° (b) 30° (c) 60° (d) 70.5°

14 Two prisms of the same material their apex angles are 5°, 10° respectively, so the ratio between their dispersive powers equals ....

(a) 2 : 1 (b) 1 : 1 (c) 1 : 2 (d) 3 : 1

15 In liquid steady flow, the ratio between the number of streamlines in the wide part of the tube to the number of them in the narrow part of the same tube is ....

(a) greater than 1 (b) less than 1 (c) equal to 1 (d) double

16 A plane surface of area 0.2 m^2 moves at velocity 3 m/s, parallel to another static surface and separated from it by a layer of a liquid whose thickness is 12 cm, if the viscosity coefficient is 0.8 kg/m.s, the tangential force required to keep the surface moving in this velocity is .... N.

(a) 10 (b) 12 (c) 4 (d) 16

17 The opposite graph represents the relation between the angle of deviation and the first angle of incidence in a triangular prism, then the apex angle of the prism = ...

(a) 30° (b) 45°
(c) 60° (d) 90°

18 When the area of a moving liquid layer increases, its viscosity ....

(a) increases (b) decreases
(c) remains constant (d) increases then decreases

19 If a ray of light falls perpendicularly on one of the faces of a triangular prism of apex angle 45° and emerges as a tangent to the other face, the refractive index of the prism material is ....

(a) 1.2 (b) $\sqrt{2}$ (c) $\sqrt{3}$ (d) $2\sqrt{2}$

20 A thin prism whose apex angle is 3 times its angle of deviation has a refractive index of ....

(a) 1.5 (b) 1.33 (c) 1.25 (d) 1.2

Second Answer the following questions (21 : 24) *1 Mark for each*

21 A train in a station blows a whistle of frequency 300 Hz, if there is a man standing at distance 0.99 km from the train who has heard the sound after 3 s from its production. **Find** the wavelength of the sound.

....

....

....

22 Optical fibers are used in medical endoscopes. **Explain.**

....

....

23 In Young's double-slit experiment, if the distance between the centers of the fifth bright fringe and the central fringe is X, **calculate** the distance between the centers of the second dark fringe and the central fringe.

....

....

24 Liquid flows steadily in a tube of radius r with 2 m/s, ending with narrow nozzle with radius 0.5 r, **calculate** the speed of liquid at the narrow end.

....

....

Exam 9

Kafr El-Sheikh Governorate
Desouk Directorate



First — Choose the correct answer (1 : 20)

1 Mark for each

1 The change in the direction of the light beam as a result of its passage through small openings, cracks or edges of materials is called ....

(a) total reflection (b) refraction (c) diffraction (d) reflection

2 A light ray is incident on the surface of a liquid with an absolute refractive index 1.25 with an angle of incidence 60°, so the angle of refraction in the liquid is ....

(a) 43.8° (b) 23.57° (c) 35.26° (d) 32.32°

3 When the radius of the steady flow tube is doubled, the volume flow rate ....

(a) does not change
(b) decreases to its half
(c) decreases to its quarter
(d) increases four times

4 For a flat plate with an area of 0.01 m^2 to move at a speed of 12.5 cm/s parallel to another plate at rest and isolated from it by a layer of thickness 0.002 m of liquid with a liquid of viscosity coefficient 4 kg/m.s, this requires exerting on it a force ....

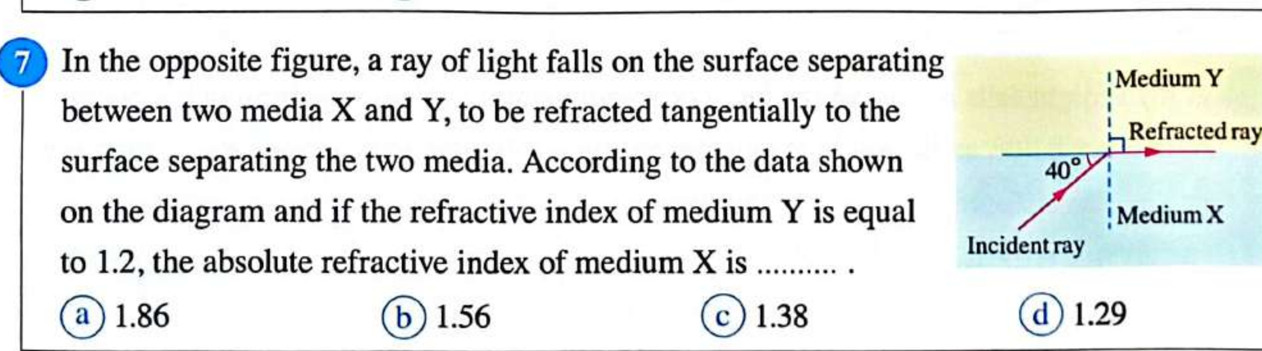
(a) of 2.5 N tangential to the plate
(b) of 250 N tangential to the plate
(c) of 2.5 N perpendicular to the plate
(d) of 250 N perpendicular to the plate

5 A thin prism whose refractive index for red and blue lights respectively are 1.5 and 1.53 has a dispersive power of ....

(a) no correct answer (b) 0.0119 (c) 0.0198 (d) 0.058

6 A ray of light falls on the face of a triangular prism with an apex angle 30° and emerges perpendicular to the other face, if the refractive index of the prism material is $\sqrt{3}$, the first angle of incidence of the light beam is ....

(a) 52° (b) 60° (c) 45° (d) 30°



7 In the opposite figure, a ray of light falls on the surface separating between two media X and Y, to be refracted tangentially to the surface separating the two media. According to the data shown on the diagram and if the refractive index of medium Y is equal to 1.2, the absolute refractive index of medium X is ....

(a) 1.86 (b) 1.56 (c) 1.38 (d) 1.29

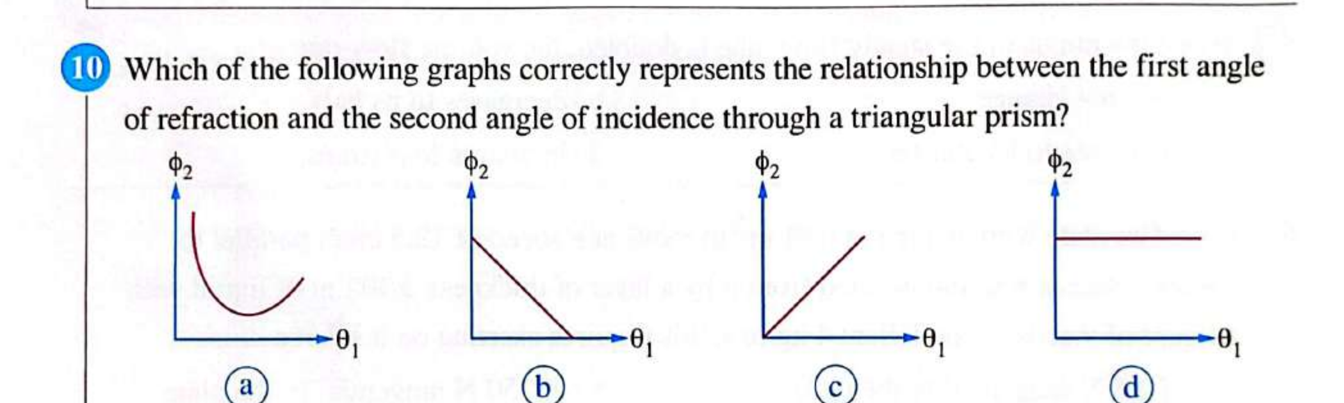
8 In Thomas Young's experiment, if the distance between the centers of two successive bright fringes is 5 mm and the distance between the two slits is 0.2 mm while the distance between the double-slit and the observation screen is 2 m, then the wavelength of the used light is ....

(a) 5000 μm (b) 500 Å (c) 500 nm (d) 5000 nm

9 A thin prism is completely immersed in a liquid whose refractive index is less than the refractive index of the prism material by 0.4, so if the ray deviates from its path at an angle equal to one third of the apex angle, the refractive index of the prism material is ....

(a) 1.6 (b) 1.5 (c) 1.4 (d) 1.2

10 Which of the following graphs correctly represents the relationship between the first angle of refraction and the second angle of incidence through a triangular prism?



11 The ratio between the refractive index of the core material in the optical fiber to the refractive index of the outer layer material is .... one.

(a) there is no relationship between them (b) equal to

(c) smaller than (d) greater than

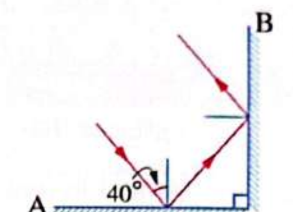
12 A tube with a diameter of 4 cm in which a liquid of density 800 kg/m^3 steadily flows at speed of 0.58 m/s, so the mass of liquid flowing every minute is approximately .... kg.

(a) 45 (b) 35 (c) 11 (d) 140

13 A ray of light falls on one of the faces of an equilateral triangular prism with an angle of incidence 40°, so the angle of emergence equals 50°, the angle of deviation of the ray is ....

(a) 20° (b) 40° (c) 50° (d) 30°

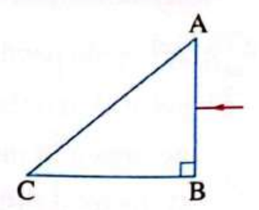
14 In the opposite figure, two mirrors are perpendicular to each other, if the ray falls at an angle of 40° on mirror A, the angle of reflection on mirror B is ....



(a) 40° (b) 30°

(c) 20° (d) 50°

15 An isosceles triangular prism has material refractive index $\sqrt{2}$, if the incident ray is perpendicular to the AB face, so when it emerges from the prism, it changes its path by an angle of ....



(a) 90° (b) 180°

(c) 45° (d) 0°

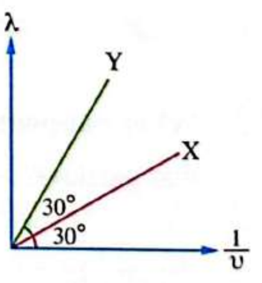
16 If you know that the speed of light in glass $v_g = 2 \times 10^8$ m/s and the speed of light in water $v_w = \frac{9}{4} \times 10^8$ m/s, the relative refractive index from glass to water $_g n_w$ is ....

(a) $\frac{8}{9}$ (b) $\frac{9}{8}$ (c) $\frac{9}{4}$ (d) $\frac{4}{9}$

17 A triangular prism has an apex angle of 60° and a refractive index of 1.5, the angle of minimum deviation is ....

(a) 28.3° (b) 30.4° (c) 60.1° (d) 37.2°

18 The opposite figure shows the graphic relationship between the reciprocal of frequency and the wavelength of multiple waves of the same type in two different media, the ratio between the speed of light in medium X to its speed in medium Y is ....



(a) $\frac{1}{1}$ (b) $\frac{1}{3}$ (c) 3 (d) $\sqrt{3}$

19 A large wall is away from the source of waves by 64 m, the source emits transverse waves with a frequency of 200 Hz, so if the waves reach the wall after time of 0.2 s, the number of complete oscillations between the source and the wall is .... oscillations.

(a) 10 (b) 80 (c) 20 (d) 40

20 In the position of the minimum deviation in a triangular prism, the ratio between the angle of emergence of the beam and the first angle of refraction $\left(\frac{\theta_2}{\theta_1}\right)$ is ....

ⓐ greater than or equal to one
ⓑ less than one
ⓒ equal to one
ⓓ greater than one

Second Answer the following questions (21 : 24)

1 Mark for each

21 A simple pendulum was pushed from point A to reach point B and then automatically returned to point C as shown in the opposite figure.

If the total distance driven by the pendulum through this motion was 12 cm and the return time from B to C was 0.2 s,

calculate:

(a) Vibration amplitude (where B is the maximum offset).

(b) Pendulum frequency.

....

....

....

....

22 It is preferable to use red light instead of blue light in the double-slit experiment to study the interference fringe pattern. **Give a scientific explanation.** (Note that: $\lambda_{red} > \lambda_{blue}$)

....

....

23 **What happens if** we use pure water in lubrication processes instead of oils prepared for that purpose?

....

....

24 In the opposite figure, a light beam is perpendicular to the AC face of the triangular prism that has an apex angle of 40° and a refractive index 1.5. **Calculate** the deviation angle of the light beam.

....

....

....

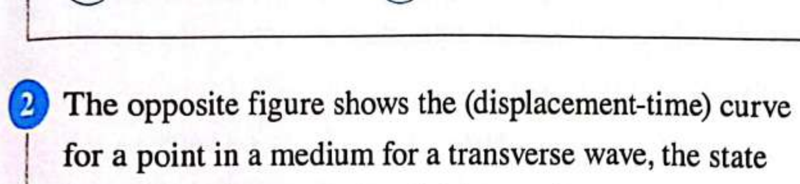
Exam 10



Minya Governorate
Beni Mazar Directorate

First Choose the correct answer (1 : 20) *1 Mark for each*

1 The opposite figure represents the movement of a simple pendulum ball from X to Y. If the distances between NY, MN and LM are equal, the intervals of time for distances ....

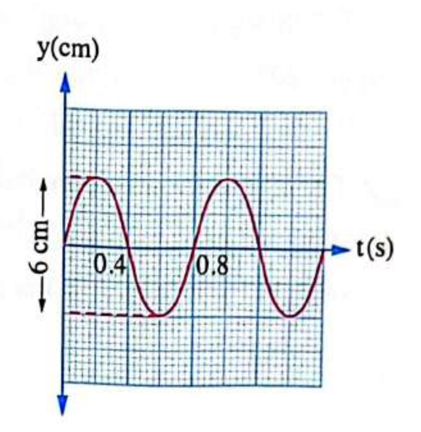


(a) NY = MN = LM (b) LM > MN > NY

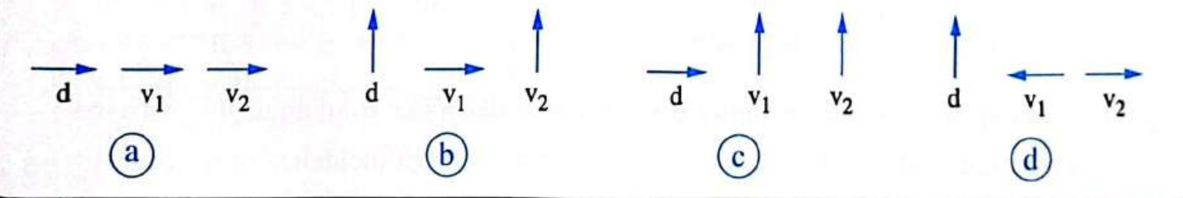
(c) LM < MN < NY (d) MY = LM

2 The opposite figure shows the (displacement-time) curve for a point in a medium for a transverse wave, the state describing the properties of this wave is ....

	υ (Hz)	T (s)	A (cm)
(a)	2.5	0.4	6
(b)	1.25	0.8	3
(c)	0.4	2.5	6
(d)	0.8	1.25	3



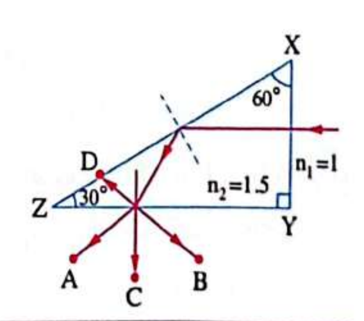
3 The best vector diagram that shows the directions of each of the speed of waves' propagation and the speed of vibration of the particles of the medium and the displacement that occurs to them at a certain instant in the case of longitudinal waves is ....



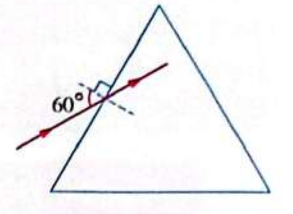
4 If a light ray falls on the (XY) face of a triangular prism as in the figure, according to the laws of the prism, the ray that emerges may pass through point ....

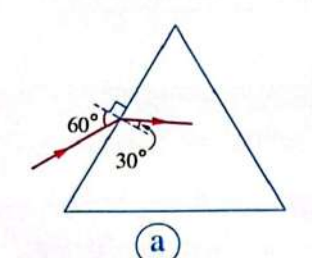
(a) D (b) C

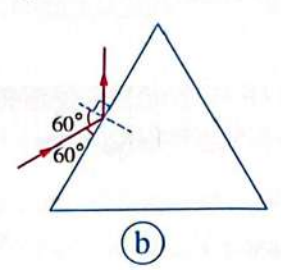
(c) B (d) A

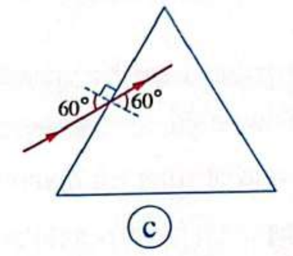


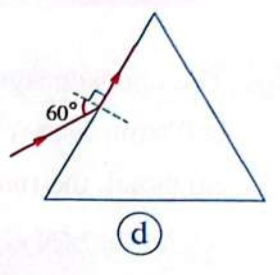
5 A prism has a refractive index ($n = \sqrt{3}$), one of the students assumed the incident and refracted rays as shown in the opposite figure, so if the student assumption is incorrect, the shape must be modified to look like shape ....











(a) (b) (c) (d)

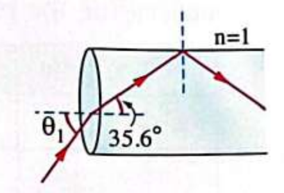
6 If the apex angle of a prism is 60° and the angle of the minimum deviation of a light ray through it is 40°, the angle of refraction of this ray is ....





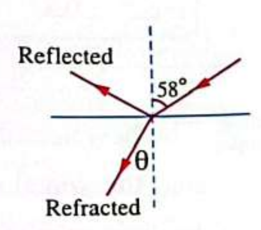
(a) 20° (b) 30° (c) 50° (d) 60°

7 The figure shows an optical fiber with a critical angle of its material with air 51.4°, so the angle of incidence of light from the air (θ_1) is equal to ....



(a) 48.1° (b) 54.4° (c) 51.4° (d) 35.6°

8 A light ray is incident at an angle of incidence 58° on the surface of a glass plate that has a refractive index 1.6, if a part of it is reflected and another part is refracted, the angle between the reflected and refracted rays will equal ....



(a) 90° (b) 50° (c) 73.13° (d) 70.13°

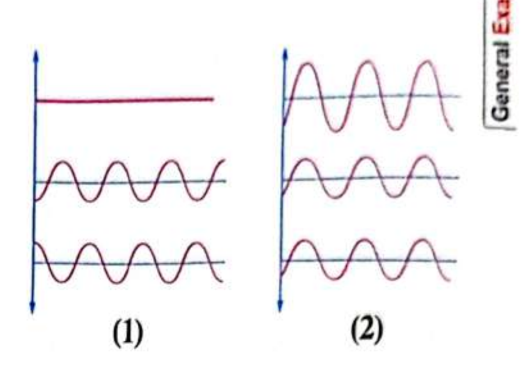
9 The Sun appeared to a diver under the surface of the water at an angle 45° with the perpendicular to the surface. If ($n_{water} = 1.33$), the angle of incidence of the Sun ray on the surface is equal to ....

(a) 60° (b) 50° (c) 73.13° (d) 70.13°

10 When light falls on several apertures, the diffraction of the light will be more observable if the aperture size equals ....

(a) 10^{-2} m (b) 10^{-3} m (c) 10^{-4} m (d) 10^{-5} m

11 The opposite figures show two types of interference, on which the result of each is shown, so the types of interference are .... , ...



	(1)	(2)
(a)	constructive	constructive
(b)	destructive	destructive
(c)	constructive	destructive
(d)	destructive	constructive

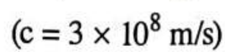
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12 In the double-slit experiment, when using a monochromatic light with a wavelength of 6000 Å, a fringe pattern was formed on an observation screen at a distance (R) from the double-slit and the distance between each two successive bright fringes was (Δy_1). If a monochromatic light with a wavelength of 4000 Å was used and the distance is increased to the double between the double-slit and observation screen, the distance between each two successive bright fringes became (Δy_2), so the ratio $\left(\frac{\Delta y_1}{\Delta y_2}\right)$ = ...

(a) $\frac{3}{4}$ (b) $\frac{4}{3}$ (c) $\frac{6}{4}$ (d) $\frac{1}{3}$

---

13 The opposite figure illustrates the incidence of a light ray from medium X on the interface with air, so the speed of light in medium X is equal to ....

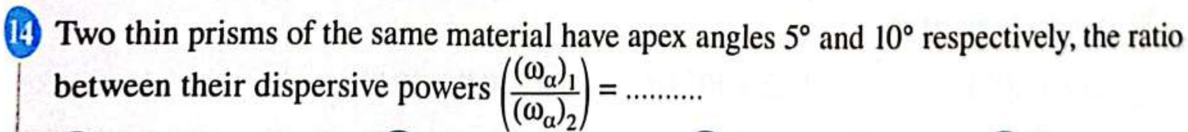

($c = 3 \times 10^8$ m/s)

Air
X
50°

(a) 1.4×10^8 m/s (b) 2.3×10^8 m/s
(c) 1.92×10^8 m/s (d) 2.7×10^8 m/s

---

14 Two thin prisms of the same material have apex angles 5° and 10° respectively, the ratio between their dispersive powers $\left(\frac{(\omega_\alpha)_1}{(\omega_\alpha)_2}\right)$ = ...

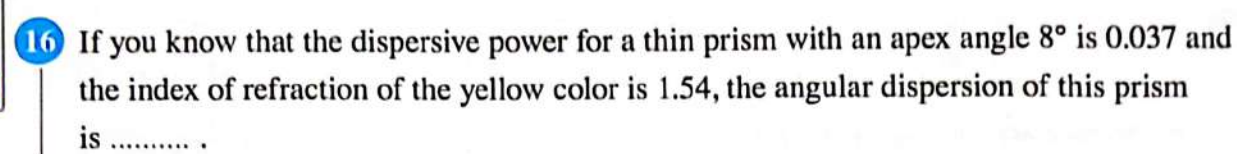


(a) 0.6 (b) 0.5 (c) 2 (d) 1

---

15 A thin prism whose apex angle is 8° and the refractive index of its material for red is 1.52 and for blue is 1.54. The angle of deviation of red and blue lights respectively, are .... , ...

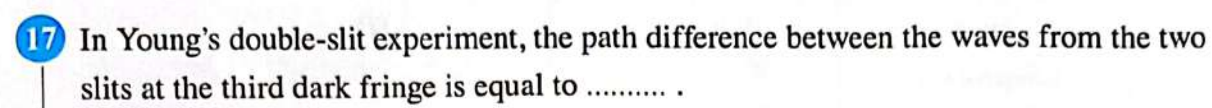
(a) 4.26°, 4.32° (b) 4.16°, 4.26° (c) 4.16°, 4.32° (d) 4.26°, 4.16°



16 If you know that the dispersive power for a thin prism with an apex angle 8° is 0.037 and the index of refraction of the yellow color is 1.54, the angular dispersion of this prism is ....

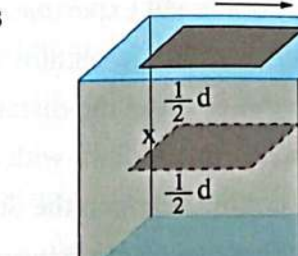
(a) 0.11° (b) 0.14° (c) 0.12° (d) 0.16°

17 In Young's double-slit experiment, the path difference between the waves from the two slits at the third dark fringe is equal to ....



(a) $\frac{\lambda}{2}$ (b) $\frac{3\lambda}{2}$ (c) $\frac{5\lambda}{2}$ (d) $\frac{7\lambda}{2}$

18 A thin plate was moving on the surface of a homogeneous liquid with a speed (v), if it got moving at position (x) with the same speed at a depth of $\left(\frac{1}{2}\text{ d}\right)$, the viscosity coefficient ....



(a) decreases to half (b) decreases to a quarter

(c) remains constant (d) increases to double

19 The average speed of blood flow in the aorta whose radius is 0.7 cm equals 0.33 m/s. From the aorta, the blood is distributed among 30 arteries, each of them has a radius of 0.35 cm, so the speed of the blood in them is ....

(a) 0.044 m/s (b) 0.44 m/s (c) 0.444 m/s (d) 0.54 m/s

20 A pump has a cross-sectional area of 5 cm^2, water flows from its nozzle at a speed of 12 m/s and the density of the water is 1000 kg/m^3, so the mass of water flowing during 30 minutes is equal to ....

(a) 18.2×10^3 kg (b) 15.2×10^3 kg (c) 10.8×10^3 kg (d) 11.2×10^3 kg

Second | Answer the following questions (21 : 24) | *1 Mark for each*

21 A medicine solution is injected slowly into a vein using a syringe with a piston surface area of 2 cm^2. If the flow rate through the syringe is 8 cm^3/s, **find** the radius of the needle that must be used so that its exit velocity is $\frac{20}{\pi}$ m/s.

....

....

....

....

22 **Explain why** using a reflective prism is preferable to using a mirror.

....

....

23 A solid body is falling from air into a liquid so at the moment of entering into the liquid, **does** it lose part of its momentum?

....

....

24 **When does** the angle of deviation become outside the prism?

....

....

....

....



كيفية طباعة صفحات معينة من ملف معين



مثلا ازاى نطبع الصفحات من صفحة 4 الى صفحة 9

خطوة 1

خطوة 2
اختيار اسم الطابعة بتاعتك

خطوة 3
كتابة الصفحات المراد طباعتها
نكتب رقم 4 ثم نكتب الشرطة دي - ثم نكتب 9

خطوة 4
اختيار نوع الورق

خطوة 5
اختيار A4

خطوة 6

حمل الآن

مجانا وحصريا

امتحانات رقم (2)







Final Exam 1

Cairo Governorate
«Rod El Farag Directorate»

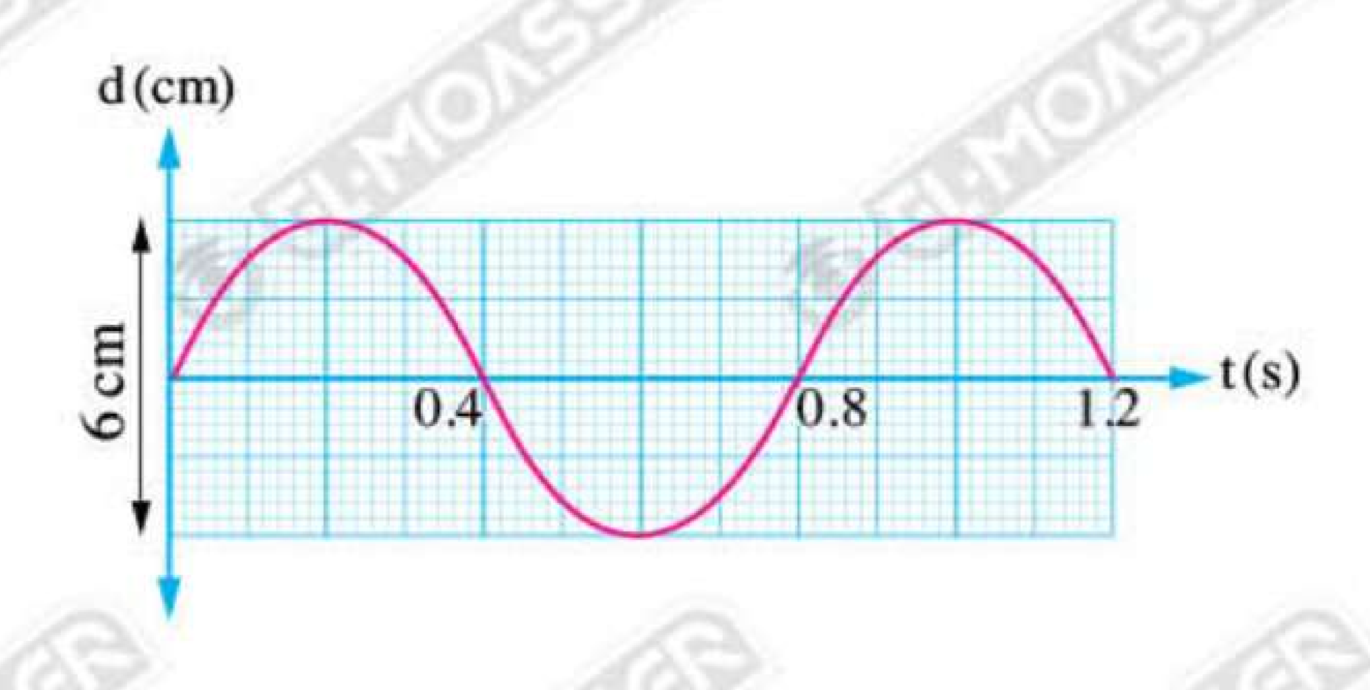
First : Choose the correct answer (1 : 20) :

1 Diamond is more shining than glass due ....

(a) refraction (b) total internal reflection
(c) diffusion (d) diffraction

2 In the given figure :

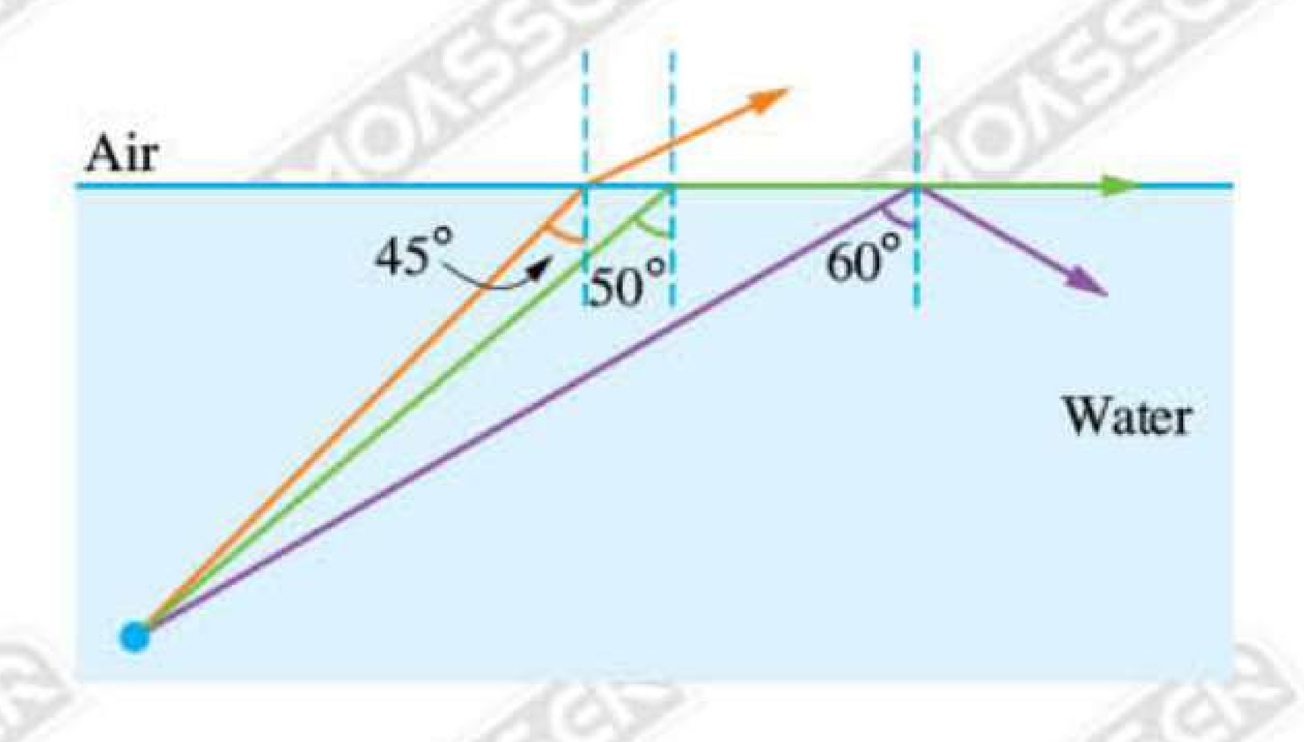
	Amplitude (cm)	T (s)	υ (Hz)
(a)	6	0.4	2.5
(b)	3	0.8	1.25
(c)	6	2.5	0.4
(d)	3	1.5	0.8



3 A liquid flows through a tube of uniform diameter (D) with velocity (v), if a stopper of cork having a hole was put at the end of the tube and the diameter of the hole equals $\frac{D}{4}$, the velocity of flow of the liquid out from the hole equals ....

(a) $\frac{v}{4}$ (b) 4 v (c) 16 v (d) $\frac{v}{16}$

4 The given figure shows 3 light rays incident from a light source inside water with different angles of incidence, so the refractive index (n) of water equals ....




(a) 1 (b) 1.3
(c) 1.15 (d) 1.56

5 A thin prism of apex angle 6° deviates light rays by 3°, so the refractive index of its material is ....

(a) 1.5 (b) 1.6 (c) 1.7 (d) 1.8

6 If the time between the pass of the first crest and the tenth crest by a point in the path of its wave motion is 0.2 sec. so the frequency of its source equals ....

(a) 45 Hz (b) 50 Hz (c) 55 Hz (d) 60 Hz

7 A light ray is incident on the separating surface between two transparent media, if the ratio between the speeds of the light wave in the 2 media $\left(\frac{v_1}{v_2} = \frac{2}{3}\right)$, so the ratio between, the frequencies of the light wave in the 2 media $\left(\frac{\upsilon_1}{\upsilon_2}\right)$ equals ....

ⓐ $\frac{1}{3}$ ⓑ $\frac{2}{3}$ ⓒ $\frac{1}{1}$ ⓓ $\frac{3}{2}$

8 If the absolute refractive index of water is 1.33, so the time required by light to cover a distance of 20 m in water is ....

(Given that : the speed of light in air = 3×10^8 m/s)

ⓐ 8.85×10^{-8} s ⓑ 1.13×10^{-7} s ⓒ 2.25×10^{-8} s ⓓ 4.52×10^{-8} s

9 A transverse wave in which the vertical distance between a crest and a trough equals the horizontal distance between a crest and successive trough, if the wave speed = 3.2 m/s, its frequency = 16 Hz, so the amplitude of wave equals ....

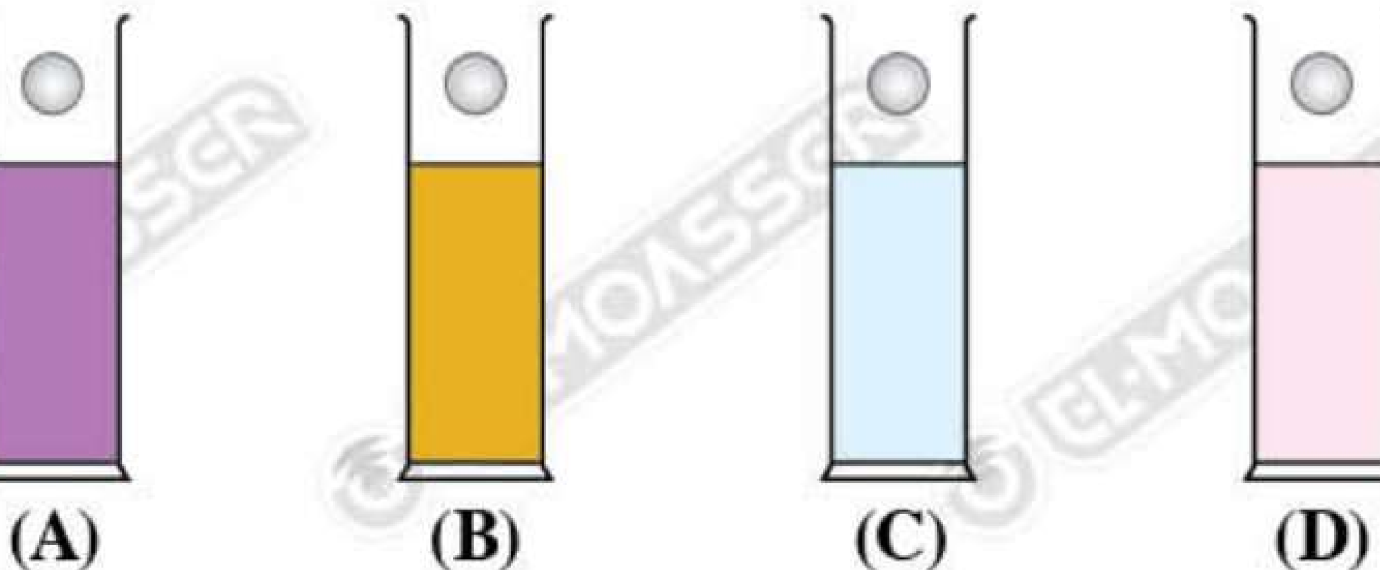
ⓐ 0.5 m ⓑ 0.2 m ⓒ 0.1 m ⓓ 0.05 m

10 The ratio of the distances between the central fringe and first lighted fringe in Young's experiment in the case of using red light and using violet light is ....

ⓐ greater than one ⓑ less than one

ⓒ one ⓓ cannot determine the answer

11 The given figure illustrates 4 jars containing different liquids, 4 similar metallic balls fall from the same height, the time taken by the balls to reach the bottom of the jars is as follows :



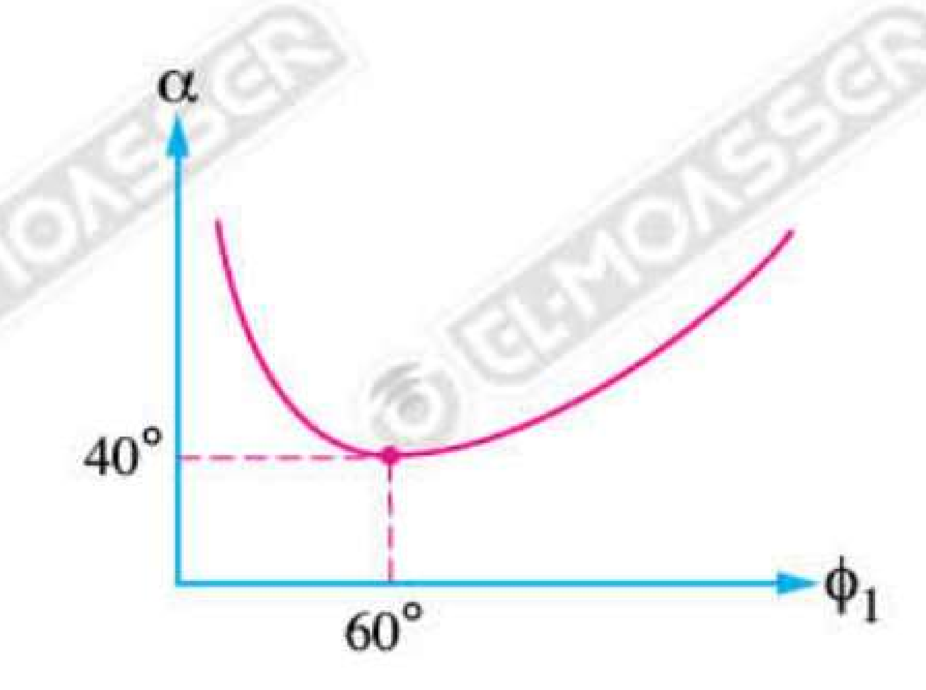
Jar	A	B	C	D
Time	0.2 s	0.6 s	0.8 s	0.4 s

So, which of the following choices is correct ?

ⓐ Liquid in jar (A) has the largest viscosity. ⓑ Liquid in jar (C) has the largest viscosity.

ⓒ Liquid in jar (D) has the smallest viscosity. ⓓ All liquids have the same viscosity.

12 The given figure represents the relation between angle of deviation (α) and the first angle of incidence (ϕ_1), so the apex angle of the prism and the refractive index are respectively ....



ⓐ 60°, 1.5 ⓑ 75°, 1.35
ⓒ 80°, 1.45 ⓓ 80°, 1.35

13 A major artery of diameter 0.5 cm, the speed of blood through it is 0.4 m/s, is branched into number of capillaries, the diameter of each is 0.2 cm and speed of blood in each one is 0.25 m/s, so the number of capillaries equals ....

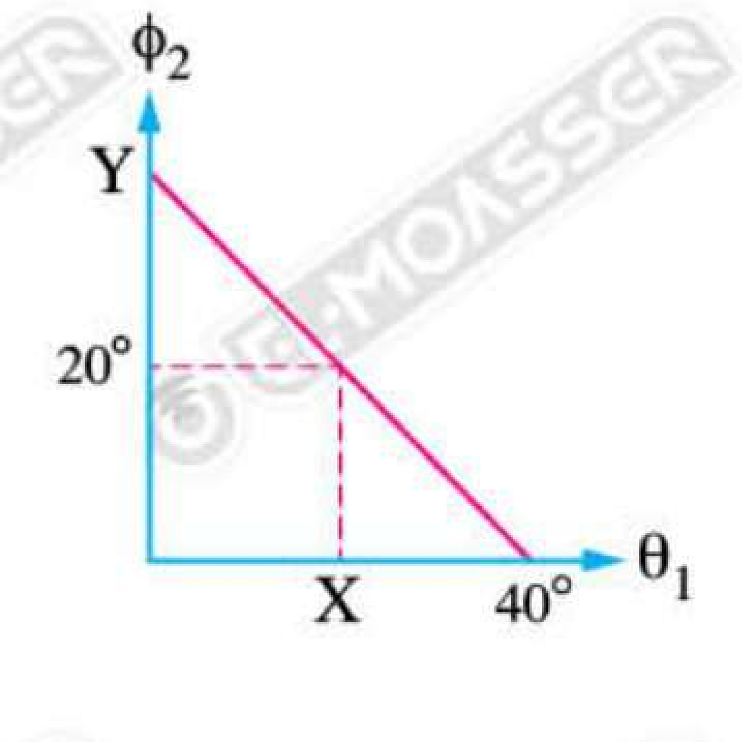
ⓐ 5 ⓑ 100 ⓒ 20 ⓓ 10

14 When the angle of incidence changes from 60° to 30°, the angle of refraction changes from 45° to ....

ⓐ 22.5° ⓑ 24° ⓒ 25° ⓓ 30°

15 The given figure represents the relation between the second angle incidence (ϕ_2) and the first angle of refraction (θ_1), so which of the following choices is correct ?

	Point Y		Point X	
	Represents	**Equals**	**Represents**	**Equals**
ⓐ	Apex angle	60°	First angle of incidence in state of minimum deviation	20°
ⓑ	Angle of deviation	60°	Apex angle	20°
ⓒ	Apex angle	40°	Angle of deviation	20°
ⓓ	Apex angle	40°	First angle of refraction in state of minimum deviation	20°



16 In the experiment of double slits, if the distance between the two slits is 10^{-4} m and the distance between two fringes of the same type is 3.75 mm and the screen that receives fringes is at distance of 0.75 m from the two slits, the wavelength of the used light equals ....

ⓐ 5000 Å ⓑ 5400 Å ⓒ 6000 Å ⓓ 6400 Å



17 The given figure represents the path of light ray through equilateral glass prism, the refractive index of its material is 1.5 so angle θ equals ....

ⓐ 47.2° ⓑ 43°
ⓒ 52.4° ⓓ 27°

18 A light ray is incident with angle 45° on a triangular prism of apex angle 30°. It emerges perpendicular to the other side, so its angle of deviation equals ....

ⓐ 30° ⓑ 25° ⓒ 20° ⓓ 15°

19 In Young's double slit experiment the fringes are more clear on ....

ⓐ decreasing the distance between the two slits and screen
ⓑ increasing the distance between the two slits and screen
ⓒ increasing the distance between the two slits
ⓓ decreasing the wavelength of monochromatic light use.

20 The diffraction and refraction agree in that the rays resulting after diffraction and refraction have the same initial ....

ⓐ wavelength ⓑ direction ⓒ speed ⓓ frequency

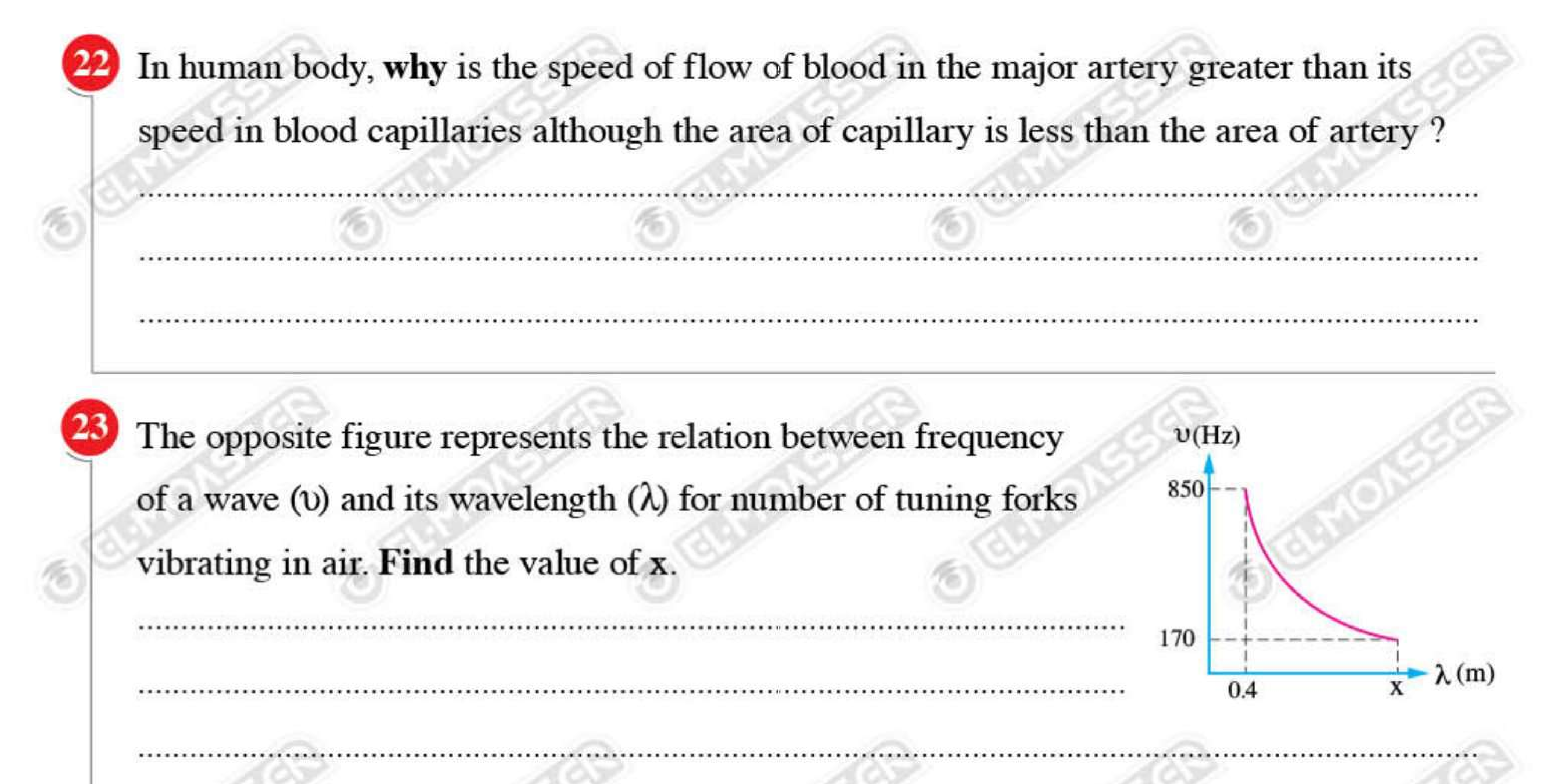
Second : Answer the following questions (21 : 23) :

21 A light ray is incident on one side of triangular prism as in the figure. **Find** the angle of emergence of light ray. (Given that : n = 1.49)

....

....

....



22 In human body, **why** is the speed of flow of blood in the major artery greater than its speed in blood capillaries although the area of capillary is less than the area of artery ?

....

....

....

23 The opposite figure represents the relation between frequency of a wave (υ) and its wavelength (λ) for number of tuning forks vibrating in air. **Find** the value of **x**.

....

....

....



Final Exam 2

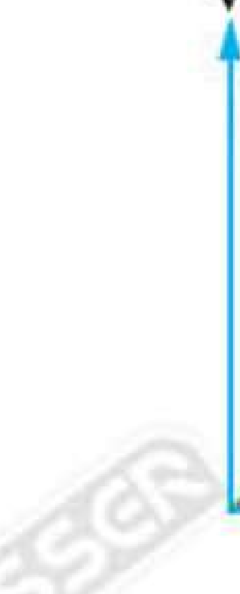
Cairo Governorate
«El Nozha Directorate»

First : Choose the correct answer (1 : 20) :

1 A sound wave of wavelength λ propagates in air with a speed 330 m/s, if it has travelled to another medium in which its speed is 660 m/s, then its wavelength increases by ....

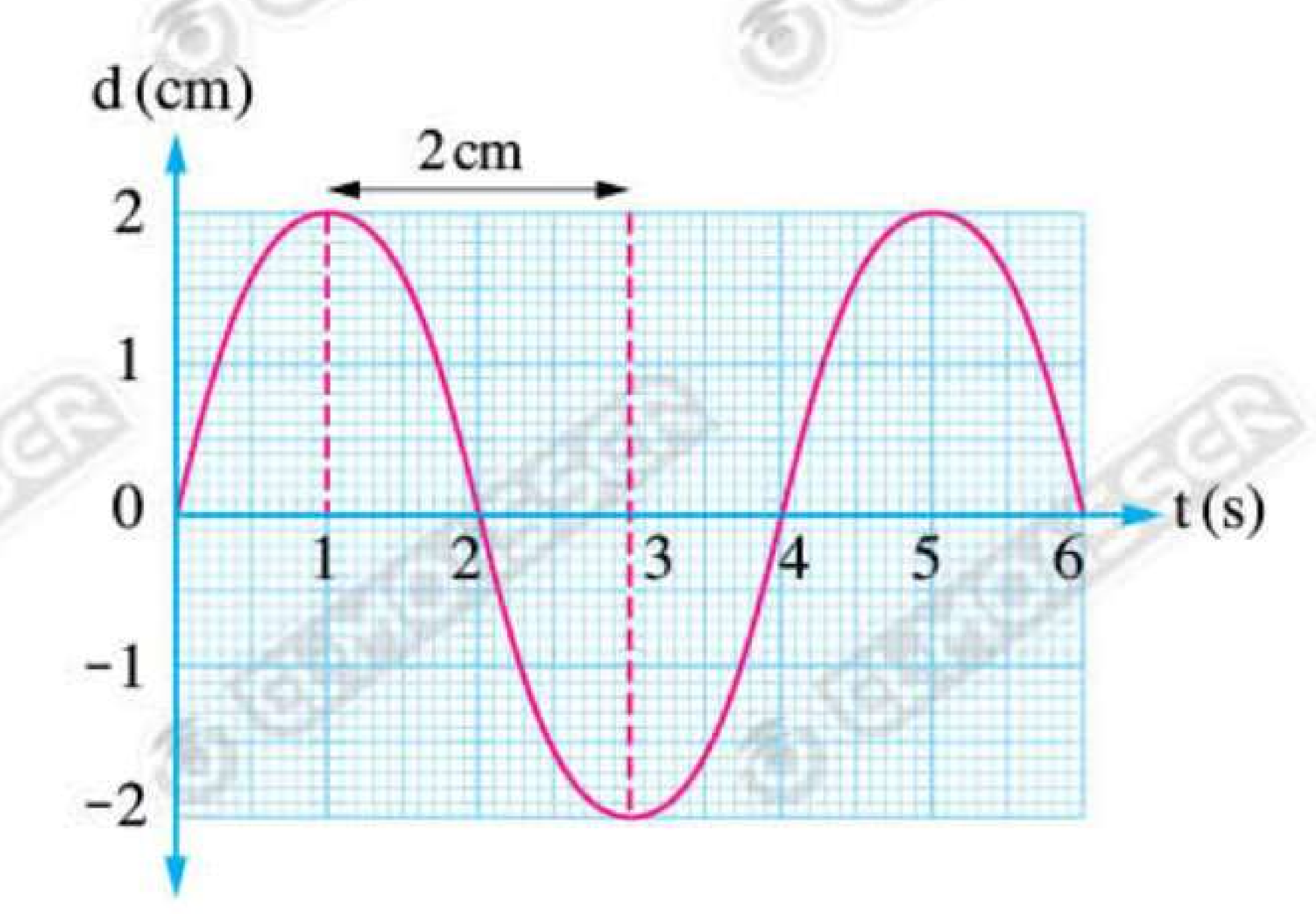
(a) λ (b) 2 λ (c) 3 λ (d) 4 λ

2 The opposite graph represents the relation between the wavelength (λ) for two waves (x, y) propagating in different media and the speed (v) of these two waves in each of these madia, so $\frac{T_x}{T_y}$ equal ....



(a) 0.577 (b) 1.73 (c) 0.464 (d) 2.15

3 The opposite graph represents the relation between the vertical displacement (d) and the time (t) of a wave motion which is formed in a rope, so the speed of the wave equals ....



(a) 0.16 m/s (b) 1 m/s
(c) 0.01 m/s (d) 0.8 m/s

4 A light ray is incident from air onto the surface of a transparent material at an angle of 40°, so the angle of refraction inside the material may equal ....

(a) 40° (b) 45° (c) 35° (d) 50°

5 In Young's double-slit experiment, a light of wavelength 500 nm fell on a double slit separated by a distance 2.5 mm, so an interference pattern appeared on a screen 1 m away from the two slits. So the distance between the centers of two successive interference fringes equals ....

(a) 0.2×10^{-3} m (b) 2×10^{-7} m (c) 2.5×10^{-3} m (d) 2.5 m

6 The light color which has the greatest value of critical angle in glass surrounded by air is ....

(a) blue (b) yellow (c) red (d) green

7 A light ray is incident on one the faces of an equilateral triangular prism getting refracted parallel to the base and emerging with an angle 60°, so the first angle of incidence (ϕ_1) of the ray equals ....

(a) 30° (b) 60° (c) 45° (d) 90°

8 When a light of wavelength (λ) is used in Young's double-slit experiment, the path difference between the two waves at the first dark fringe equals ....

(a) 1.5 λ (b) λ (c) 0.5 λ (d) zero

9 In the opposite graph, the apex angle of the thin prism equals ....

(a) 5.67° (b) 0.176°
(c) 2.7° (d) 7.6°

10 A thin prism has an apex angle of 10° is made of a material of refractive index for red light 1.5 and for blue light 1.7, so the dispersive power of the prism equals ....

(a) 0.2 (b) 1.6 (c) 0.33 (d) 0.125

11 A light ray is incident on an equilateral triangular prism, if the angle of incidence equals the angle of emergence = 45°, then the angle of deviation of the light ray equals ....

(a) 20° (b) 30° (c) 45° (d) 60°

12 Which of the following angles in an equilateral triangular prism whose material has a refractive index 1.5 could have possible values of 0° or 90° ?

(a) The deviation angle (b) The second angle of incidence
(c) The angle of refraction (d) The angle of emergence

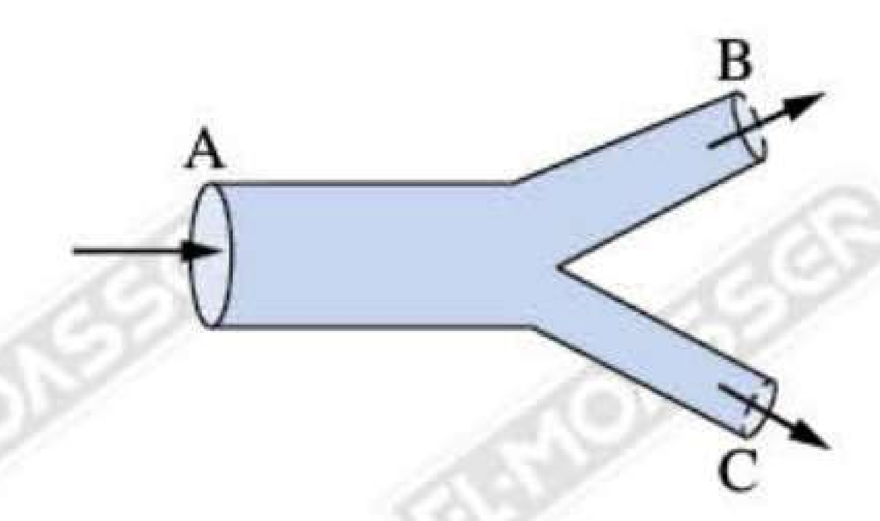
13 When the temperature of a layer of air increases, its refractive index ....

(a) increases (b) decreases
(c) doesn't change (d) increases or decreases

14 If the ratio between the absolute refractive index of the first medium and the absolute refractive index of the second medium is $\frac{2}{1}$, the ratio between the frequency of a light ray in the first medium and the frequency of the same light ray in the second medium is ....

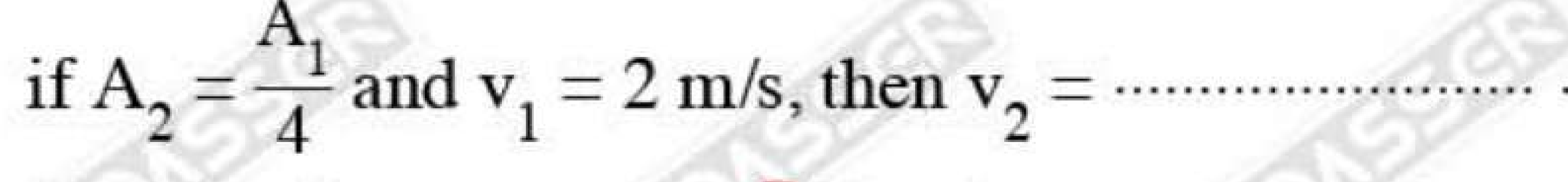
(a) $\frac{1}{1}$ (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) $\frac{2}{1}$

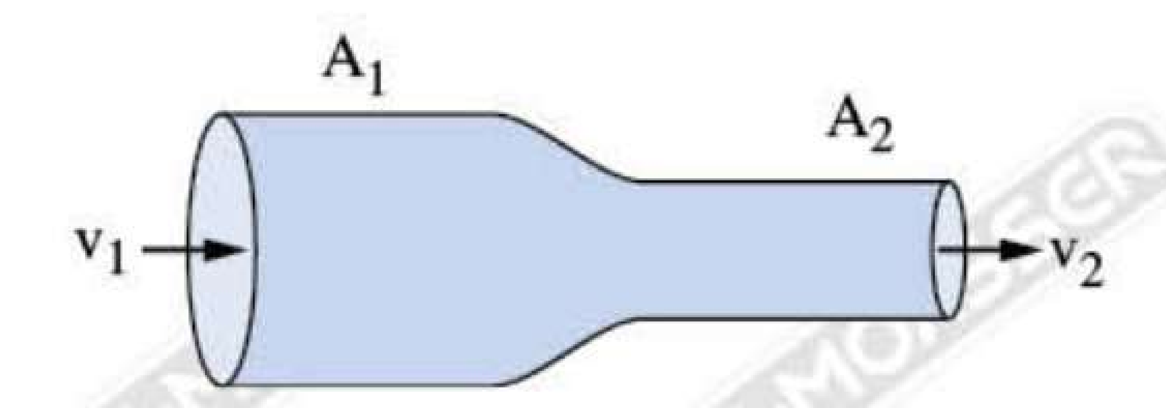
15 The opposite diagram shows a liquid flowing steadily in a tube. If the area of A = 4 cm^2, B = 1.5 cm^2, C = 1 cm^2 and the speed of the liquid in A = 2 m/s, B = 3 m/s, so the speed in C equals ....



(a) 3.5 m/s (b) 9 m/s
(c) 5 m/s (d) 2 m/s

16 The opposite figure shows a liquid flowing steadily,


if $A_2 = \frac{A_1}{4}$ and $v_1 = 2$ m/s, then v_2 = ...

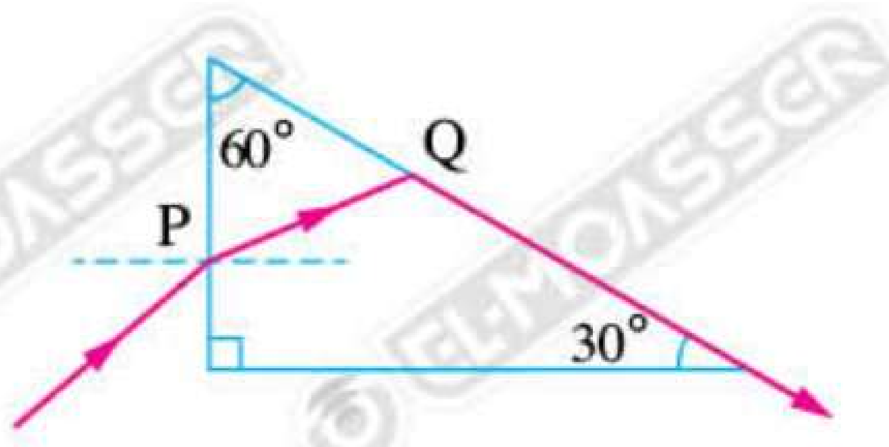


(a) 0.5 m/s (b) 2 m/s
(c) 8 m/s (d) 4 m/s

17 The ratio between the sedimentation rate of red blood cells in anemia patients and in rheumatic fever patients is ....

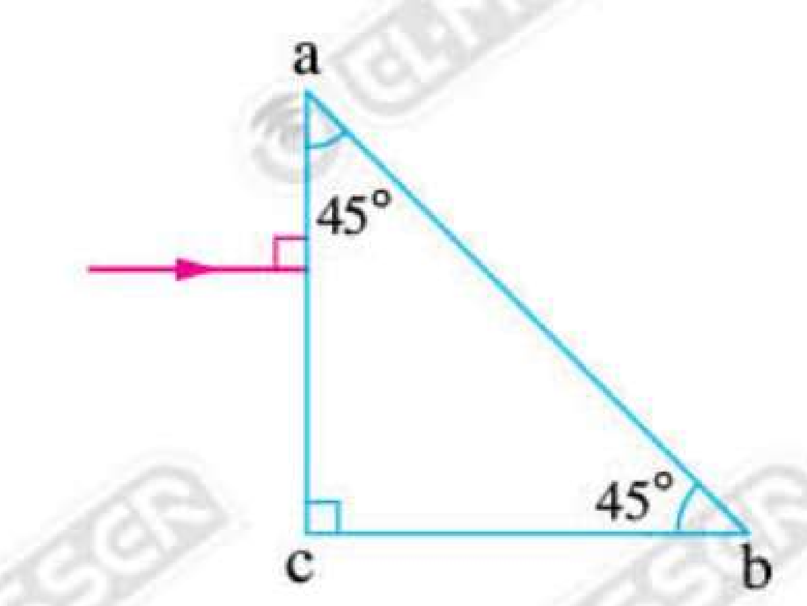
(a) less than one (b) equal one
(c) greater than one (d) less or greater than one

18 In the opposite figure, a light ray falls on the face of a prism at point P, so the angle of refraction equals 15°, then it falls on the opposite face at point Q and emerges tangent to that face, hence the refractive index of the prism's material for the light equals ....



ⓐ $\frac{1}{\sqrt{2}}$ ⓑ $\sqrt{2}$ ⓒ $\frac{1}{2}$ ⓓ $\frac{2}{1}$

19 In the opposite figure, if the refractive index of the prism is $\sqrt{2}$, the incident ray on face ab ....



ⓐ undergoes total internal reflection
ⓑ emerges with an angle 60°
ⓒ emerges with an angle 80°
ⓓ emerges tangent to that face

20 If the ratio between the apex angles of two thin prisms of the same material equals $\frac{3}{4}$, then the ratio between the dispersive powers of them respectively equals ....

ⓐ $\frac{3}{4}$ ⓑ $\frac{4}{3}$ ⓒ $\frac{1}{1}$ ⓓ $\frac{4}{5}$

Second: Answer the following questions (21 : 23) :

21 Longitudinal wave of wavelength 20 cm and periodic time 0.4 sec. turned to transverse wave of frequency 10 Hz that travels at double the speed of the longitudinal wave, **calculate** the wavelength of the transverse wave.

....
....
....
....

22 Water flows steadily in a tube of diameter 2 cm at a speed 8 m/s, **calculate** the mass of water coming out from the tube within one minute. ($\rho_w = 1000$ kg/m^3)

23 The opposite figure represents a light ray that is incident at an angle of 60° on one of the faces of an equilateral triangular prism whose refractive index equals 1.5.

(a) Trace the pass of the light ray in the prism.

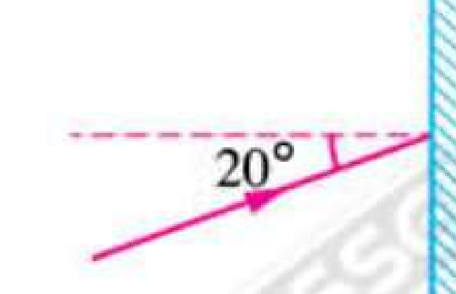
(b) Calculate the angle of deviation for the light ray.

Final Exam 3

Helwan Governorate
«El-Tebbin Directorate»

First : Choose the correct answer (1 : 20) :

1 The opposite figure shows a light ray falling on a plane mirror at an angle of incidence 20°. If the mirror is rotated in clockwise direction by an angle 4° about an axis perpendicular to the page at the point of incidence, the angle of reflection equals ....



(a) 18° (b) 16°

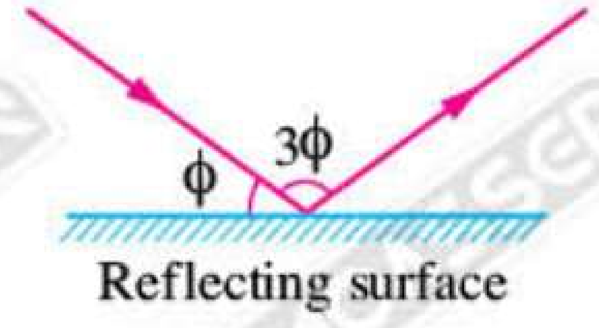
(c) 24° (d) 22°

2 If a rope is fixed to the wall and its other terminal is being moved up and down so that a wave is produced in the rope, then if you move your hand faster without changing the vertical displacement of your hand's motion or the tension force in the rope, so ....

(a) the frequency will increase (b) the amplitude will increase

(c) the amplitude will decrease (d) the frequency will decrease

3 In the opposite figure, the angle of reflection equals ....





(a) 54° (b) 108°

(c) 36° (d) 18°

4 What is the characteristic that describes only the longitudinal waves and doesn't describe the transverse?

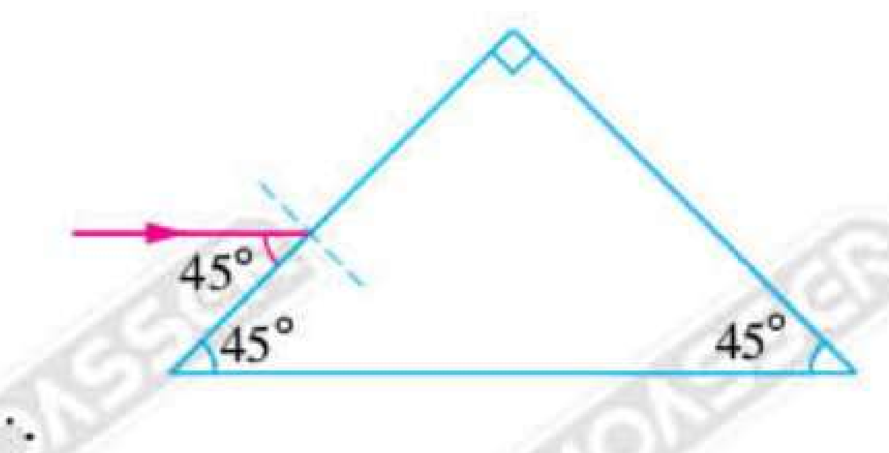
(a) They transfer energy in direction of their propagation.

(b) They can be travelling.

(c) Their speed of propagation differs from medium to another.

(d) They require a medium in order to propagate.

5 In the opposite figure, a light ray is incident at angle of 45° on one of the faces of an isosceles right angled triangular prism whose material refractive index is 1.5, then the value of the angle of emergence equals ....



(a) 90° (b) 45° (c) 0° (d) 42°

6 If the refractive index of medium (A) is double the refractive index of medium (B) where the speed of light in medium (A) = 0.1 c, then the speed of light in medium (B) equals ....

$(c = 3 \times 10^8 \text{ m/s})$

ⓐ 0.1 c ⓑ 0.005 c ⓒ c ⓓ 0.2 c

7 A light ray deviates from its path with an angle α when it passes through a glass thin prism surrounded by air, so when this prism is submerged in water, the angle of deviation of the light ray through it becomes ....

ⓐ α ⓑ less than α ⓒ greater than α ⓓ zero

8 The bottom of a swimming pool may not be seen when looking at if from the air because of the .... of the light.

ⓐ interference ⓑ total internal reflection
ⓒ refraction ⓓ diffraction

9 The opposite figure shows a liquid flowing steadily in a tube from one terminal to the other, where the diameter = 0.5 D and the speed of liquid = v m/s at M, so the ratio of density of streamlines through the cross-sections L : N is ....

ⓐ 2 : 1 ⓑ 1 : 1 ⓒ 12 : 3 ⓓ 0.5 : 1

10 If the critical angle of a light ray that transfers from a medium of refractive index 1.72 to another medium is 55°, then the refractive index of the second medium equals ....

ⓐ 1.41 ⓑ 1.56 ⓒ 1.48 ⓓ 1.53

11 The ratio between the deviation angle of the green light and the deviation angle of the orange light is .... after they emerge from a triangular prism at minimum deviation position.

ⓐ angular dispersion ⓑ deviation angle
ⓒ less than 1 ⓓ greater than 1

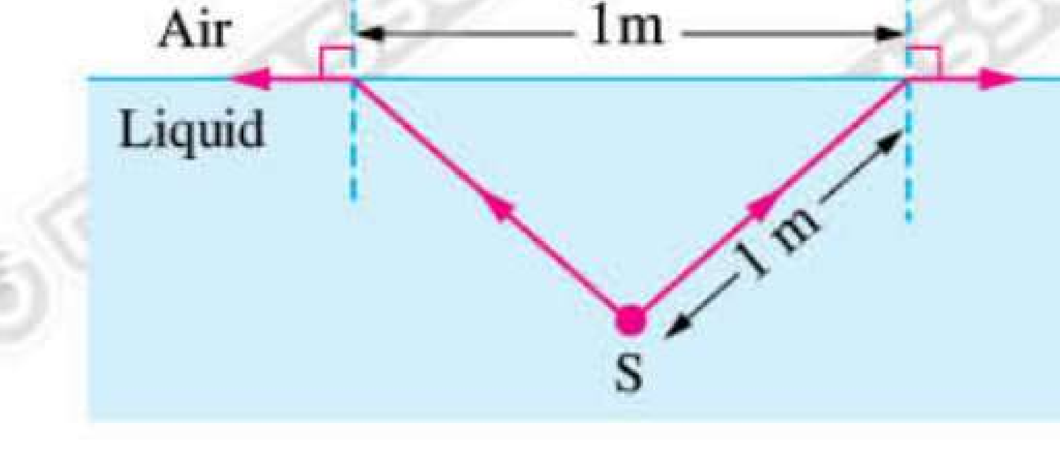
12 When a light ray falls on one of the faces of an equilateral triangular prism in the position of minimum deviation and the angle of deviation of light equals 50°, then refractive index of the prism's material = ...

ⓐ 1.45 ⓑ 1.64 ⓒ 1.72 ⓓ 1.75

13 When a swimmer jump into water and rise to the surface, the force that changes its direction will be ....

ⓐ the swimmer weight
ⓑ the frictional force between the swimmer and water
ⓒ the buoyant force of water that acts on the swimmer
ⓓ all of these forces

14 The opposite figure shows light rays that are produced from a point light source placed in a transparent liquid. So, the refractive index of this liquid is ....

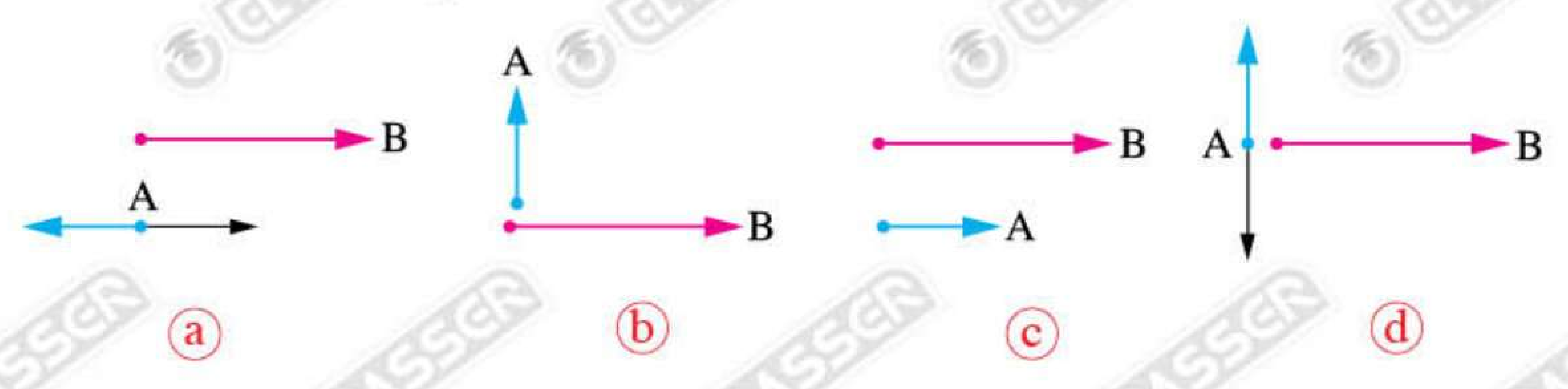


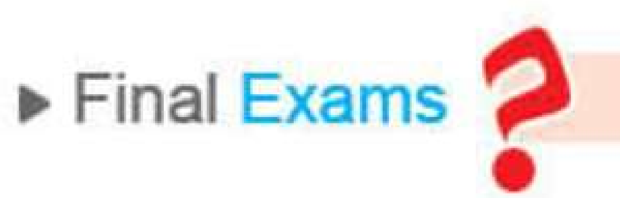
ⓐ 1.5 ⓑ 1.8 ⓒ 2 ⓓ 1.7

15 A layer of a viscous liquid of thickness 12 cm is put between parallel horizontal plane plates (A , B), then the force required to move a thin plate (C) of area 0.5 m^2 between the two plates with a uniform speed parallel to them equals ....

ⓐ $F_C = F_{AC} + F_{BC}$ ⓑ $F_C = F_{AB}$ ⓒ $F_C = F_{CB} + F_{AB}$ ⓓ F_C = zero

16 The figure that represents the direction of the vibration of the particles (A) relative to the direction of the propagation of the wave through a horizontal rope (B) attached to the lower branch of a horizontal tuning fork in air is ....

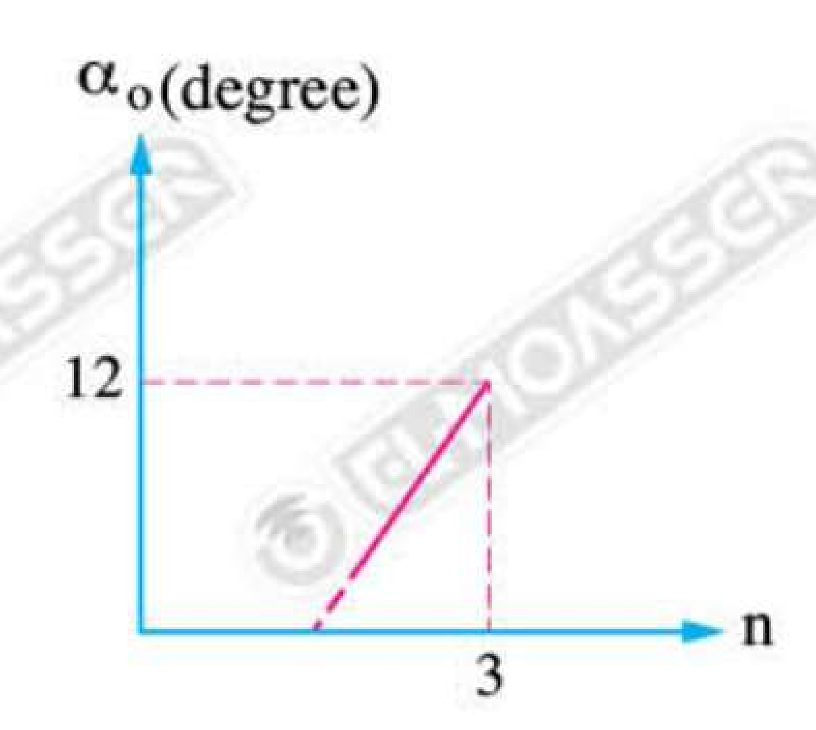




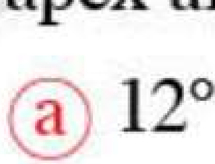
17 A triangular prism whose apex angle is three times the value of the minimum angle of deviation at which the light ray falls on one of its faces with an angle of incidence = 30°, then the second angle of incidence inside the prism = ...

ⓐ 30° ⓑ 22.5° ⓒ 15° ⓓ 45°

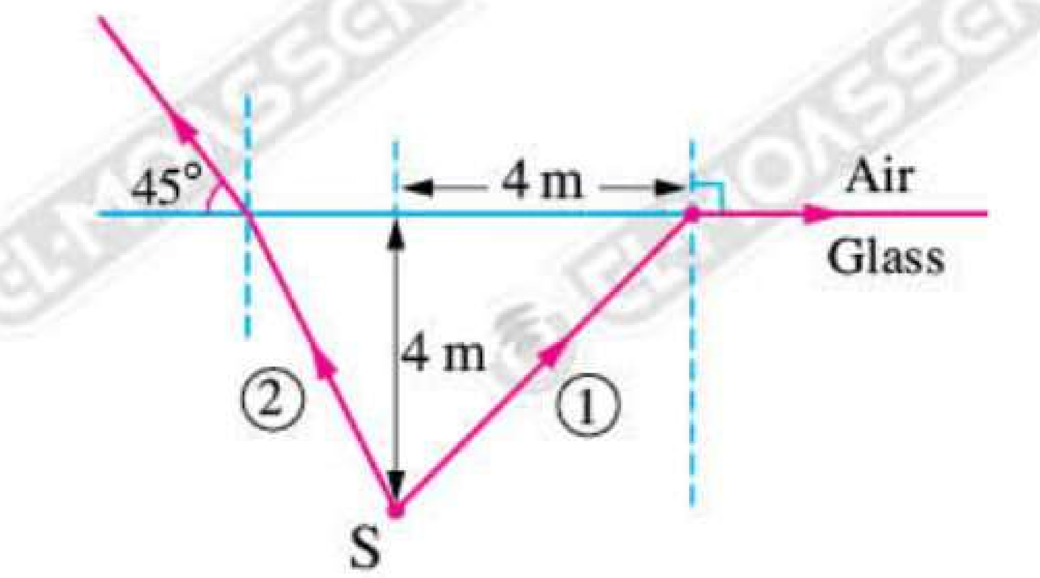
18 The opposite graph represents the angles of deviation (α_o) of light through several thin prisms with the same apex angle versus the refractive indices (n) of the materials of those prisms, so the value of any apex angle = ...



ⓐ 12° ⓑ 8°
ⓒ 6° ⓓ 4°



19 The drawing shown in the figure illustrates two rays of light (1), (2) that are produced from a source S in the glass and travel to air as in the figure, so the angle between the rays (1) and (2) is equal to ....



ⓐ 75° ⓑ 45°
ⓒ 90° ⓓ 60°

20 In Young's double slit experiment, when a light of wavelength λ is used, the distance between the centers of the central fringe and the ninth bright fringe was 1.5 cm. If the wavelength of the used light is changed to 1.5 λ, then the distance 1.5 cm will be between the center of the central fringe and the center of the .... bright fringe.

ⓐ sixth ⓑ seventh ⓒ ninth ⓓ tenth

Second : Answer the following questions (21 : 24) :

21 Two waves of wavelengths 1500 cm and 350 cm respectively propagate in a medium and the difference between their frequencies is 1.3 Hz. **Calculate** the speed of their propagation in the medium.

22 The image of a coin in a cup of water appears higher than the place of the piece itself, when another quantity of water is placed in the cup, the new image of the coin appears .... relative to the image in the first case before the water was put.

23 A basin of capacity 200 liters is required to be filled with a liquid of density 800 kg/m^3 at a mass flow rate that equals 0.5 kg per second, **so calculate** the time required to fill the basin.

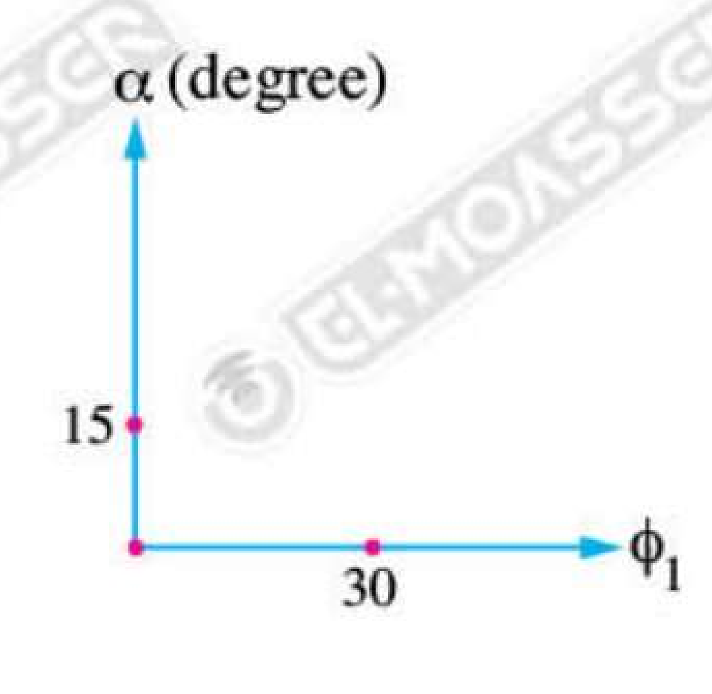
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....

24 On the opposite graph between the angle of deviation of a light ray in a triangular prism α with the change in the angle of incidence ϕ_1 and when the angle of incidence is 30° the minimum angle of deviation 15° **draw the graphic relationship on the same drawing that shows what happens to** the angle of deviation when the angle of incidence is less than 30°.



....

....

....

....

Final Exam 4



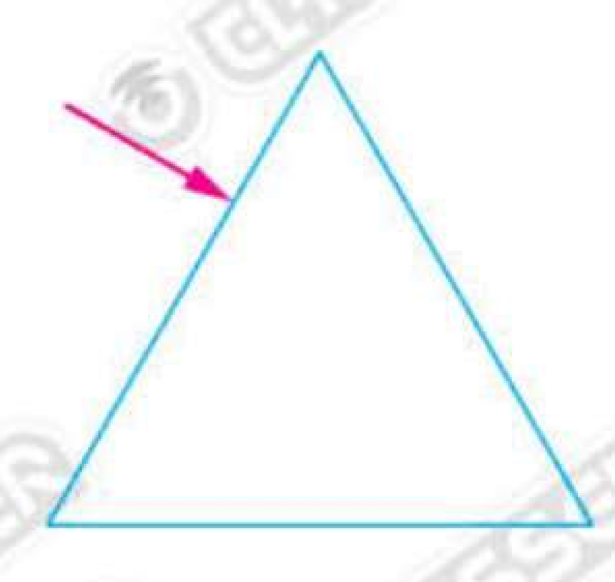
Giza Governorate
«Dokki Directorate»

First : Choose the correct answer (1 : 20) :

1 When the vibrating body passes by its origin (rest) position so, it has ....

(a) maximum displacement and no velocity
(b) maximum displacement and velocity
(c) no velocity or displacement
(d) no displacement and maximum velocity

2 In the opposite figure, the ray of light fall perpendicular on one face of the faces of an equilateral triangular glass prism whose refractive index is 1.5, then the angle of emergence of the light ray equal ....



(a) 30° (b) 60° (c) 0° (d) 90°

3 The biggest reflective angle for a ray of light that fall from water (its refractive index 1.3) to the air is ....

(a) 42° (b) 45° (c) 90° (d) 135°

4 Light waves fall on different apertures of different sizes, so the diffraction of light will be most observable if the aperture size is ....

(a) 1 cm (b) 10^{-2} cm (c) 10^{-3} cm (d) 10^{-6} cm

5 Water flows steadily through a pipe of radius 5 cm by a speed of 4 m/sec., so the volume of the liquid that flows in half min. is .... m^3.

(a) 0.9429 (b) 1.866 (c) 0.3 (d) 0.303

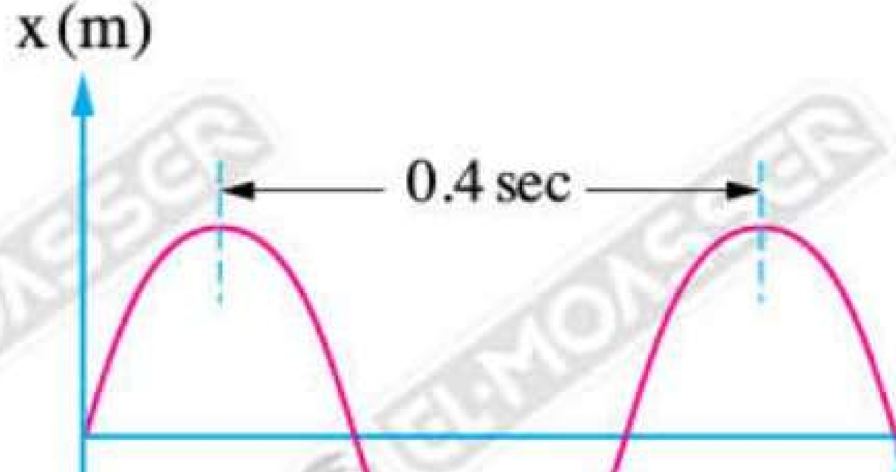
6 The ratio between the second angle of incidence (ϕ_2) and the first angle of incidence (ϕ_1) in triangular prism at minimum of deviation is ....

(a) 1 (b) less than 1 (c) more than 1 (d) zero

7 On increasing the angle of incident on the separating surface between two medium to the double, the relative refractive index between the two medium ....

(a) decreases to half
(b) increases to double
(c) remains constant
(d) decreases to quarter

8 The figure shows a transverse wave, its velocity is .... m/sec.

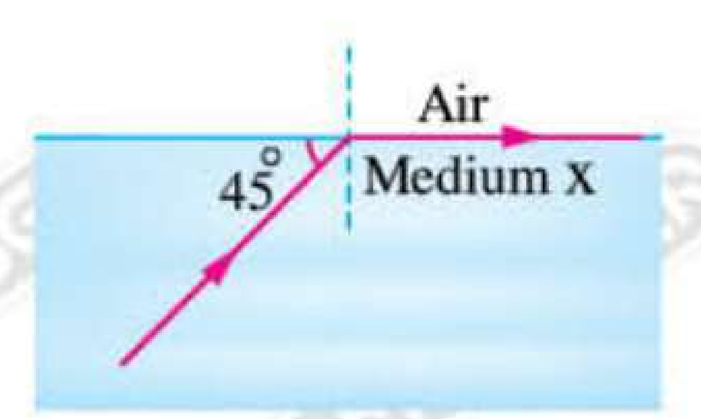


(a) 1
(b) 2
(c) 0.8
(d) 0.08

9 In thin prism, we can calculate the refractive index of its material from the relation; ....

(a) $\frac{\alpha_o}{A} + 1$
(b) $\frac{\alpha_o}{A} - 1$
(c) $\frac{A}{\alpha_o} + 1$
(d) $\frac{A}{\alpha_o} - 1$

10 The figure shows transferring ray of light from medium (x) to the air, so the velocity of light in medium (x) equals .... m/sec.
(Knowing that : $c = 3 \times 10^8$ m/sec.)



(a) 2.1×10^8
(b) 1.4×10^8
(c) 2.7×10^8
(d) 1.92×10^8

11 If the surface area of a liquid layer has increased to the double, so the viscosity coefficient of the liquid become ....

(a) double
(b) halved
(c) increase four times
(d) unchanged

12 An incident light ray fall on equilateral triangular glass prism. If the angle of incidence equals the angle of emergence which is equal to 50°, so the angle of deviation for the ray equals ....

(a) 100°
(b) 20°
(c) 40°
(d) 30°

13 When an incident ray fall on a reflecting surface and reflect on itself. This means ....

(a) angle of incidence = angle of reflection = 90°
(b) angle of incidence = angle of reflection = 0°
(c) angle of incidence = angle of reflection = 45°
(d) angle of incidence ≠ angle of reflection

14 A thin prism has an apex angle which equals three times angle of deviation of the light, so the refractive index of the prism equal ....

(a) 1.33 (b) 1.5 (c) 1.6 (d) 1.7

15 If the distance between the third crest and the eighth crest of transverse wave is 20 m, so the wavelength equal .... m.

(a) 5 (b) 4 (c) 3 (d) 2

16 In Young's experiment, the distance between the second bright fringe and the central fringe is 10 mm, the distance between the two slits is 0.36 mm and the distance between the observing screen and the double slit is 3 m, so the wavelength equal ....

(a) 5×10^{-7} m (b) 8×10^{-7} m (c) 6×10^{-7} m (d) 4×10^{-7} m

17 In a glass prism ($\alpha = \phi_1 = A = 60°$), so the refractive index of its material ....

(a) 1.5 (b) $\sqrt{2}$ (c) 1.4 (d) $\sqrt{3}$

18 In steady flow, if the number of lines flow in the wide section is (n), so the number of lines in the narrow section is ....

(a) 0.5 n (b) n (c) 2 n (d) 3 n

19 A thin prism has refractive index for blue light 1.7 and 1.5 for red, so the dispersive power of the prism equal ....

(a) 0.22 (b) 0.33 (c) 0.5 (d) 0.6

20 Mirage phenomenon happen due to .... of white light.

(a) diffraction (b) total reflection (c) interference (d) reflection

Second : Answer the following questions (21 : 24) :

21 **Give reason for :** Precipitation rate in case of rheumatic fever increases but decreases for anemia disease.

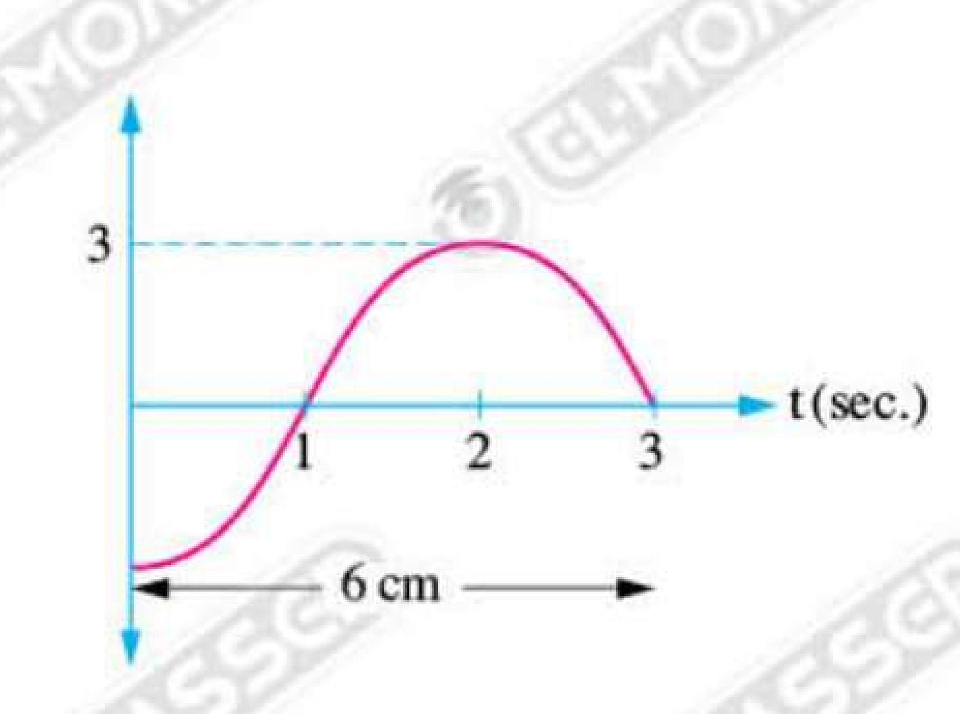
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22 The figure represents the relation between displacement in (cm) and time in (sec.) for transverse wave. **Find** its frequency.



....

....

....

23 Ray of light fall on the separating surface between two media. If the angle between incident ray and separating surface is 40° and the refractive angle in the second medium is 30°. **Calculate** the relative refractive index from medium one to medium two.

....

....

....

....

24 **What** is the function of cryolite in the reflecting prism ?

....

....

Final Exam 5



Alexandria Governorate
«El-Agamy Directorate»

First : Choose the correct answer (1 : 20) :

1 When performing a blood sedimentation rate test for three persons, the first has anemia, the second has rheumatic fever and the third is healthy, the terminal velocity of red blood cells in the plasma is ....

ⓐ in the first person is higher
ⓑ in the third person is higher
ⓒ in the second person is higher
ⓓ equal in the three persons

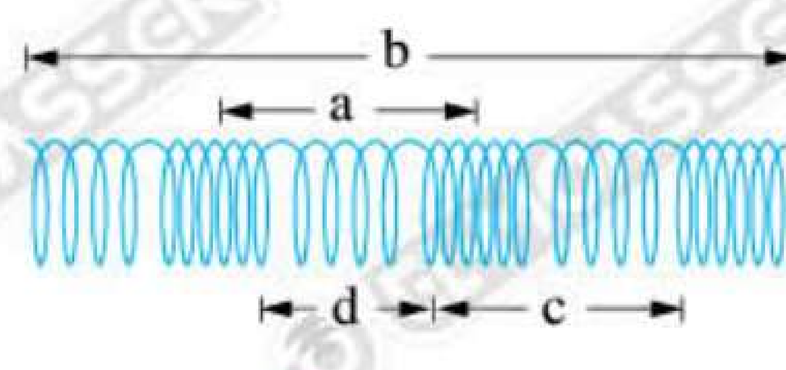
2 In Young's double-slit experiment, knowing that the distance between the central fringe and the second bright fringe is 10 mm and the distance between the two slits is 0.3 mm and the distance between the slits and the screen on which the fringes are formed is 3 m, so the wavelength of the monochromatic light used is .... m.

ⓐ 4×10^{-7}
ⓑ 8×10^{-7}
ⓒ 5×10^{-7}
ⓓ 6×10^{-7}

3 A thin prism of refractive index 1.5, so the ratio between angle of deviation of a light ray that passes through it and its apex angle = ...

ⓐ $\frac{1}{4}$
ⓑ $\frac{1}{5}$
ⓒ $\frac{1}{2}$
ⓓ $\frac{1}{3}$

4 The figure shows the propagation of a longitudinal wave through a spring. Which of the arrows shown in the figure has a length equal to the wavelength of the longitudinal wave?



ⓐ b
ⓑ a
ⓒ c
ⓓ d

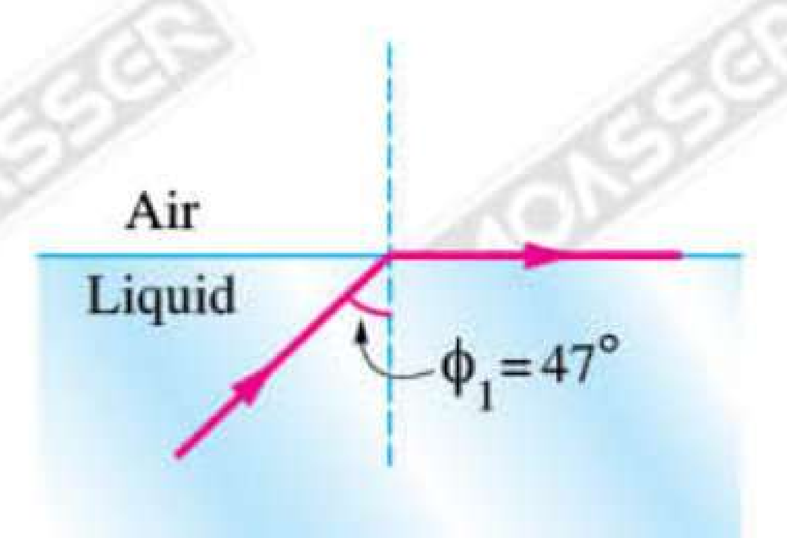
5 Which one of the following describes the relation between the wavelength of light that falls on a prism and its refractive index?

ⓐ $n \propto \lambda$
ⓑ $n \propto \frac{1}{\lambda}$
ⓒ $n \propto \frac{1}{\lambda^2}$
ⓓ $n \propto \frac{1}{\sqrt{\lambda}}$

6 Which of the following would happen to a ray of white light falling on a triangular prism that is set at the position of minimum deviation?

ⓐ It emerges decomposing into the seven colors of the spectrum.
ⓑ It passes through the prism without any refraction.
ⓒ It undergoes total internal reflection inside the prism.
ⓓ None of the above.

7 A light source that emits a beam of light is moving up to the surface of a liquid from which it exits into the air. Following the path shown in the figure, the absolute refractive index of the liquid is equal to ....



(a) 1.29 (b) 1.62
(c) 1.37 (d) 1.45

8 In Young's double-slit experiment, if the blue light is replaced by a red light. Which of the following describes correctly the effect on the interference fringes?

(a) The interference pattern disappears.
(b) The distance between the fringes increases.
(c) No change takes place.
(d) The distance between the fringes decreases.

9 A thin prism of apex angle 7°, its refractive index for the blue light is 1.68 and its refractive index for the red light is 1.6, so its average refractive index is ....

(a) 1.62 (b) 1.64 (c) 1.65 (d) 1.67

10 Two flat plates with a liquid between them, if the tangential force acting on the upper plate is decreased to half its value, so the coefficient of viscosity of the liquid ....

(a) increases to double (b) decreases to quarter
(c) increases 4 times (d) remains constant

11 A ray of light travels from an optically denser medium (A) to a less dense medium (B), in order for the light to undergo total internal reflection. Which of the following must be true about the angle of incidence?

(a) Must be equal to the critical angle.
(b) Must be more than the critical angle.
(c) Must be less than the critical angle.
(d) Depends on whether the two media are liquids or solids.

12 A liquid flows steadily through a tube, so by decreasing the cross-sectional area of the tube to $\frac{1}{3}$ its original value, the volume flow rate ....

ⓐ decreases to $\frac{1}{3}$ its value
ⓑ increases 9 times
ⓒ increases 3 times
ⓓ remains constant

13 A spring coil is tied vertically to one of the two branches of a horizontal tuning fork. When making the tuning fork vibrate, the waves generated are ....

ⓐ longitudinal in both air and spring
ⓑ transverse in both air and spring
ⓒ longitudinal in the spring and transverse in air
ⓓ longitudinal in air and transverse in the spring

14 If we have two transparent flexible materials (x) and (y) where material (x) has a lower refractive index than material (y) and can be used in making optical fibers, which of the two materials should be used in the inner layer and which should be used in the outer layer?

ⓐ Material (y) is used in the two layers.
ⓑ Material (y) is used in the inner layer and material (x) is used in the outer layer.
ⓒ Material (x) is used in the inner layer and material (y) is used in the outer layer.
ⓓ Material (x) is used in the two layers.

15 A ray of light falls on a horizontal plane mirror as shown in the figure. So, the value of the angle (γ) equals ....

ⓐ 110°
ⓑ 70°
ⓒ 90°
ⓓ 35°

16 A light ray falls with an angle of incidence (ϕ) on one face of glass triangular prism of apex angle 70° and its refractive index is $\sqrt{3}$. If the light ray emerges tangent to the opposite face, so the value of (ϕ) is ....

ⓐ 81°
ⓑ 90°
ⓒ 9°
ⓓ 35°

17 A light ray falls on a face of an equilateral triangular prism set at minimum angle of deviation, so the second angle of incidence (angle of inner incidence) is ....

ⓐ 60°
ⓑ 90°
ⓒ 30°
ⓓ 45°

18 A light ray refracts when it is transferred from a medium of refractive index 1.5 to air, so the maximum value of the angle of refraction is ....

ⓐ 48.18° ⓑ 41.81° ⓒ 180° ⓓ 90°

19 A thin prism of apex angle 10°, knowing that : $(\frac{n_b}{n_r} = \frac{23}{20})$ and $(n_y = 1.5)$ so the value of (n_b) is equal to ....

ⓐ 1.3 ⓑ 1.6 ⓒ 1.4 ⓓ 1.5

20 Knowing that the following table represents the wavelength (λ) and frequency (υ) for different waves where all of them have the same speed and propagate in the same medium, so the value of (x) is ....

λ (m)	10	20	5	X	2
υ (Hz)	60	30	120	40	300

ⓐ 25 m ⓑ 15 m ⓒ 13 m ⓓ 20 m

Second : Answer the following questions (21 : 24) :

21 **What is the reason** behind the presence of aquatic plants growing near the shore of the Nile?

....

....

....

....

22 **Describe why** it is easier for a person standing in a lighted room to see his reflection in a glass window of that room at night than during the day.

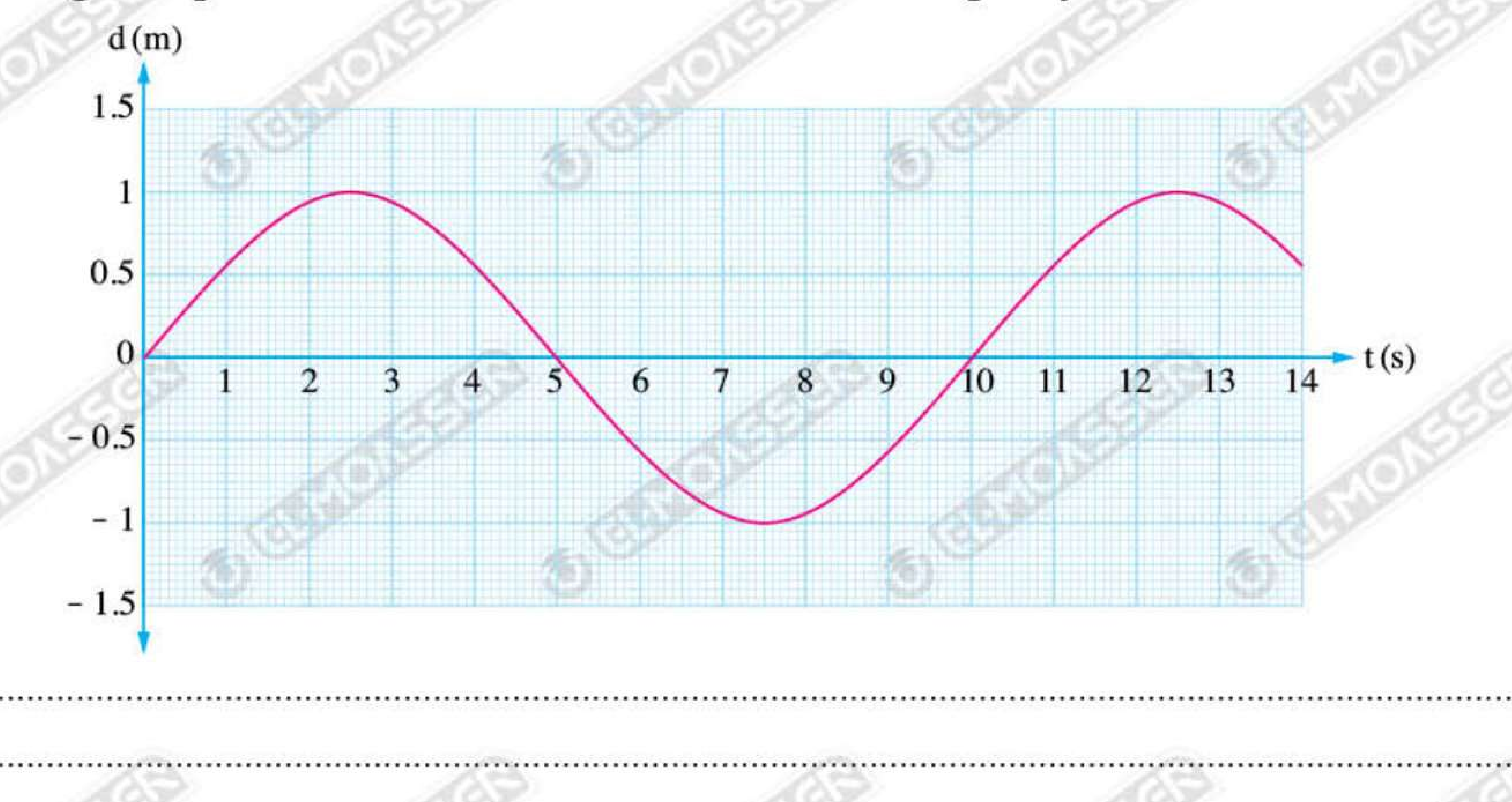
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....

....

23 The figure represents a transverse wave. **Calculate** its frequency.



....

....

....

24 Knowing that the angle of deviation of a light ray through a triangular prism can be calculated from the relation; $\alpha = (\phi_1 - 40)^2 + 20$ where ϕ_1 is the angle of incidence. **Calculate** the prism refractive index at minimum deviation position.

....

....

....

....

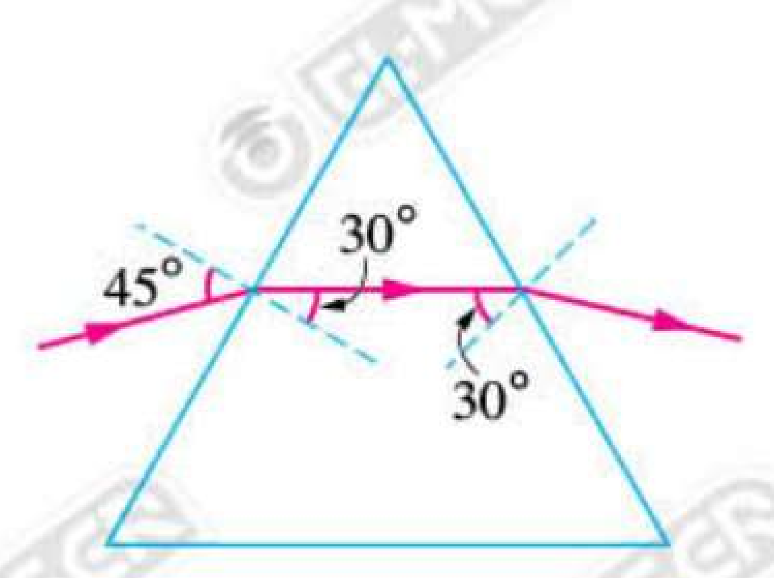


Final Exam 6

Menofia Governorate
«El-Shohadaa Directorate»

First : Choose the correct answer (1 : 20) :

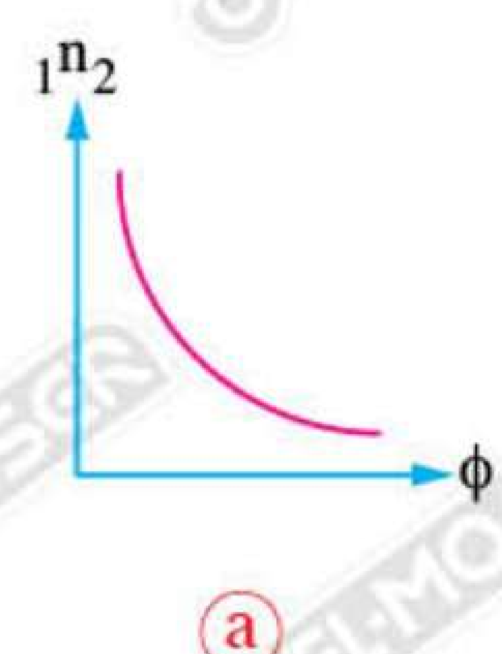
1 The opposite figure represents an equilateral triangular prism, then the angle of deviation equals ....



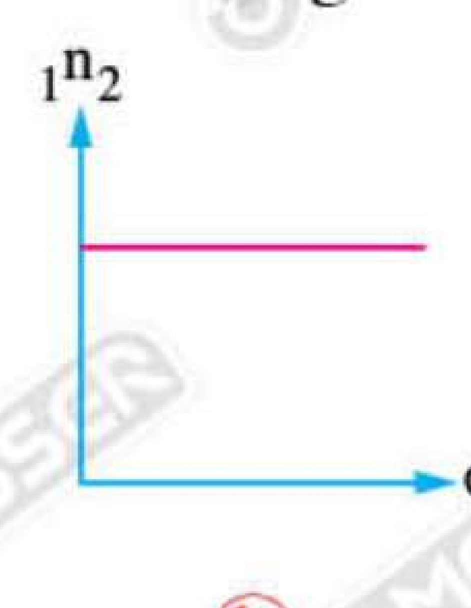
(a) 30° (b) 60°

(c) 45° (d) 55°

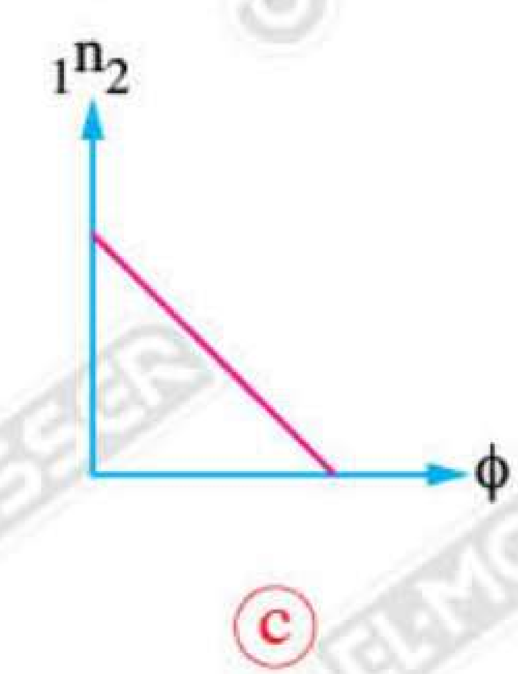

2 Which of the following graphs represents the relation between the relative refractive index between two media and the angle of incidence ?



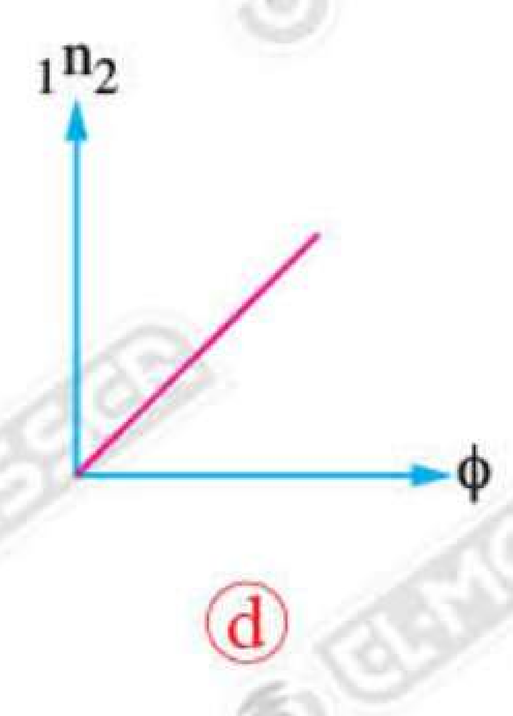
(a)



(b)



(c)



(d)

3 If the distance between the first crest and the x crest equal 0.2 m, then the horizontal distance between a crest and its successive trough equals ....

(a) $\frac{(x-1)}{0.1}$ (b) $\frac{(x-2)}{0.1}$ (c) $\frac{0.2}{(x-1)}$ (d) $\frac{0.1}{(x-1)}$

4 From the opposite figure:

When the angle between the incident light ray and the surface of plane mirror is doubled, then the angle of reflection equals ....



(a) 90° (b) 30° (c) 60° (d) 0°

5 If a light ray falls perpendicular from a medium of refractive index 1.2 to another medium of refractive index 1.5 then ....

(a) its speed increases and it refracts toward the normal line

(b) its speed decreases and it refracts toward the normal line

(c) its speed increases and it passes without any refraction

(d) its speed decreases and it passes without any refraction

6 In Young's double-slit experiment, a light of wavelength (430 nm) is used, so if the path difference = 1075 nm, then the formed fringe is ....

(a) the second bright fringe
(b) the second dark fringe
(c) the third bright fringe
(d) the third dark fringe

7 A wooden floor is covered with a layer of viscous liquid of thickness 2 mm, where a rectangular plate of area 0.12 m^2 slides on it with a velocity 0.75 m/s when it is affected by a tangential force of 126 N, then the viscosity coefficient of the liquid is .... $N.s/m^2$.

(a) 1.6
(b) 1.8
(c) 2.4
(d) 2.8

8 Two different liquids flow in two tubes, if the relation between their densities is $\frac{1}{4}$ where the volume of the first liquid that flows through time t_1 equals double of the second that flows through time t_2 and the mass flow rate of both is the same, then the ratio $\frac{t_1}{t_2}$ equals ....

(a) $\frac{1}{4}$
(b) $\frac{1}{2}$
(c) $\frac{4}{1}$
(d) $\frac{2}{1}$

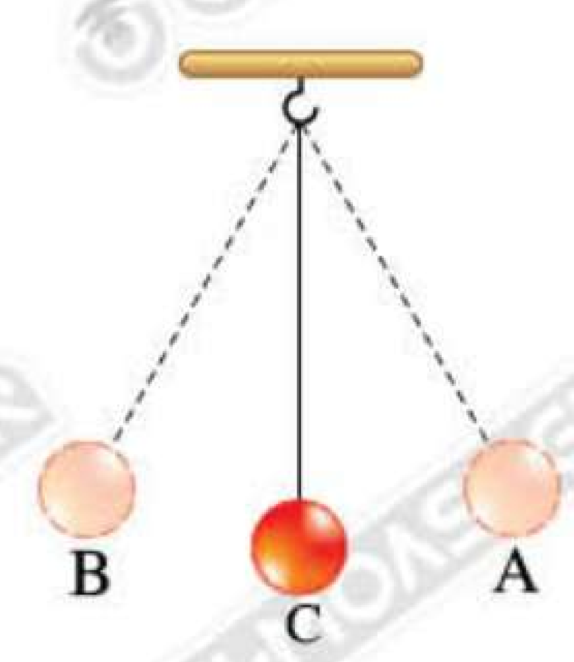
9 When proceeding blood precipitation rate tests for three people. The first has rheumatic fever, the second has anemia and the third is healthy, so the terminal velocity of red blood cells is ....

(a) higher for the first person
(b) higher for the third person
(c) higher for the second person
(d) the three persons are equal

10 A light ray falls on one of the faces of a triangular prism and emerges from the other face where the angle of emergence is three times the angle of incidence and the angle of deviation is half the angle of incidence, then the ratio between $(\frac{\alpha}{A})$ equals ....

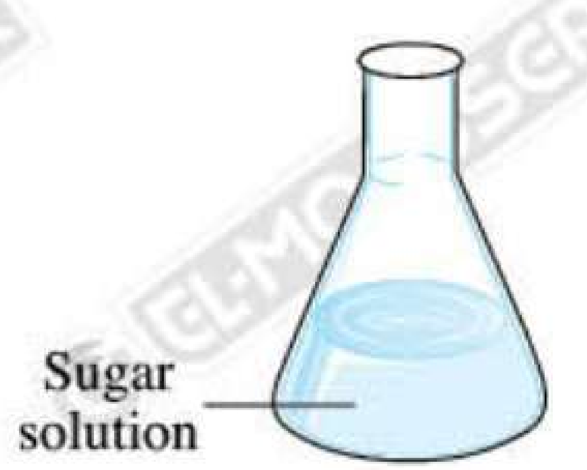
(a) $\frac{1}{4}$
(b) $\frac{1}{7}$
(c) $\frac{2}{7}$
(d) $\frac{2}{5}$

11 The opposite figure shows a vibrating simple pendulum, where its frequency equals double of its periodic time numerically, then the periodic time equals ....



(a) $\frac{1}{2}$ s
(b) 2 s
(c) $\sqrt{2}$ s
(d) $\frac{1}{\sqrt{2}}$ s

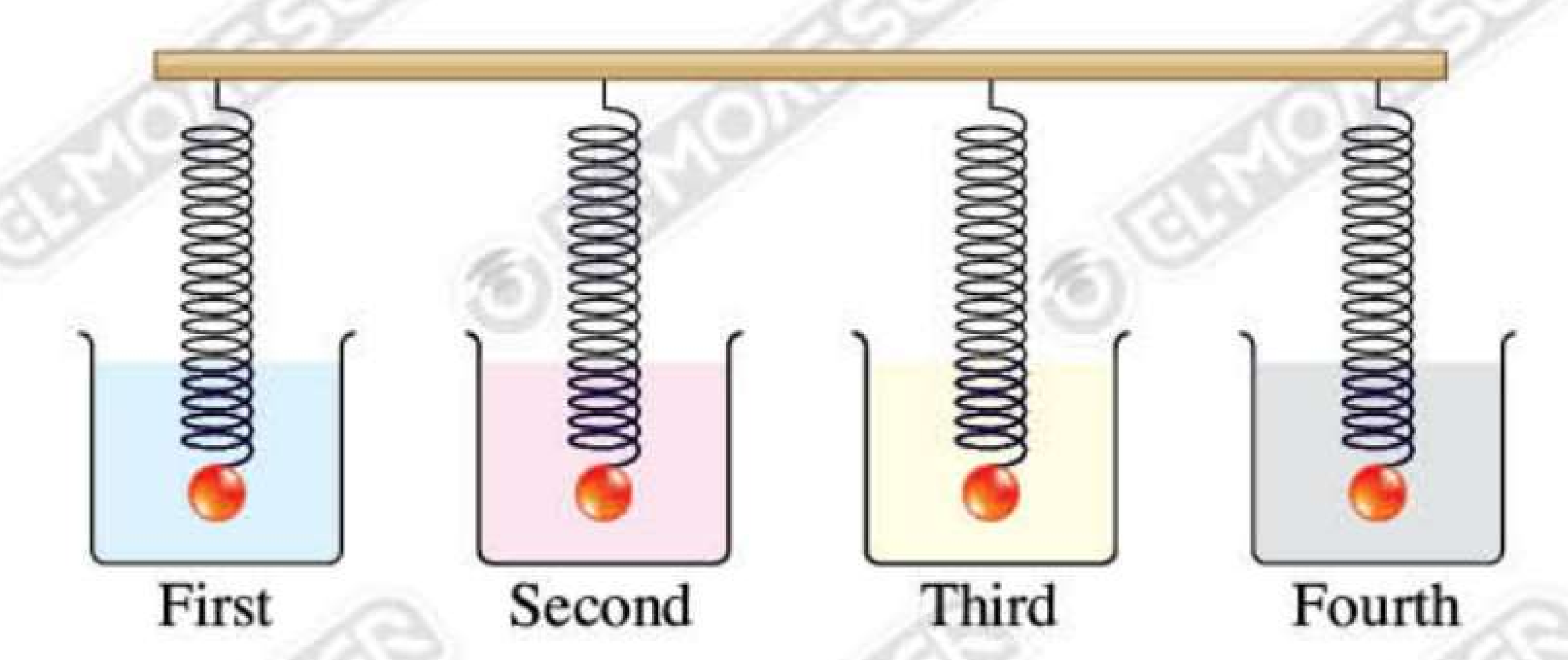
12 In the opposite beaker, a sugar solution whose absolute refractive index is 1.34, when its concentration increases the absolute refractive index becomes 1.36, then the change of its critical angle ....





(a) decreases by 0.94°
(b) increases by 0.94°
(c) decreases by 1.94°
(d) increases by 1.94°

13



In the previous figure, there are four identical masses, each suspended by a spiral coil and immersed in four different liquids, so that η_{vs} of the first is greater than that of the third, the η_{vs} of the third is greater than that of the fourth and η_{vs} of the second is as low as possible, so the order of the periodic times of the arising waves in each coil when the weight is pulled down for the same distance is a........................ .

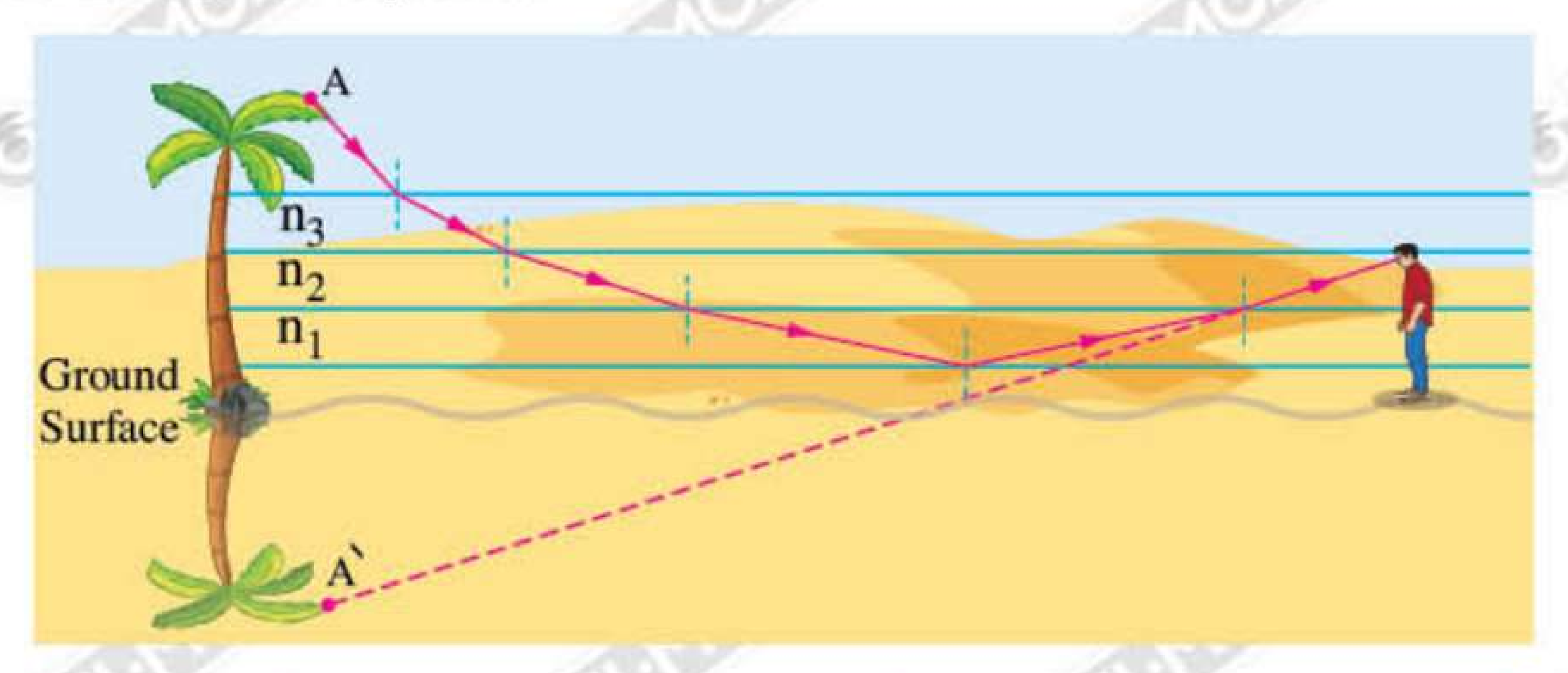
(a) $T_1 > T_3 > T_4 > T_2$
(b) $T_1 > T_2 > T_3 > T_4$
(c) $T_1 > T_4 > T_3 > T_2$
(d) $T_4 > T_1 > T_3 > T_2$

14 Two thin prisms are made of the same material, the apex angles of them are 10°, 5° respectively, so the ratio between the dispersive power for each of them $\frac{(\omega)_1}{(\omega)_2}$ = ...

(a) $\frac{1}{2}$
(b) $\frac{1}{3}$
(c) $\frac{1}{1}$
(d) $\frac{2}{1}$

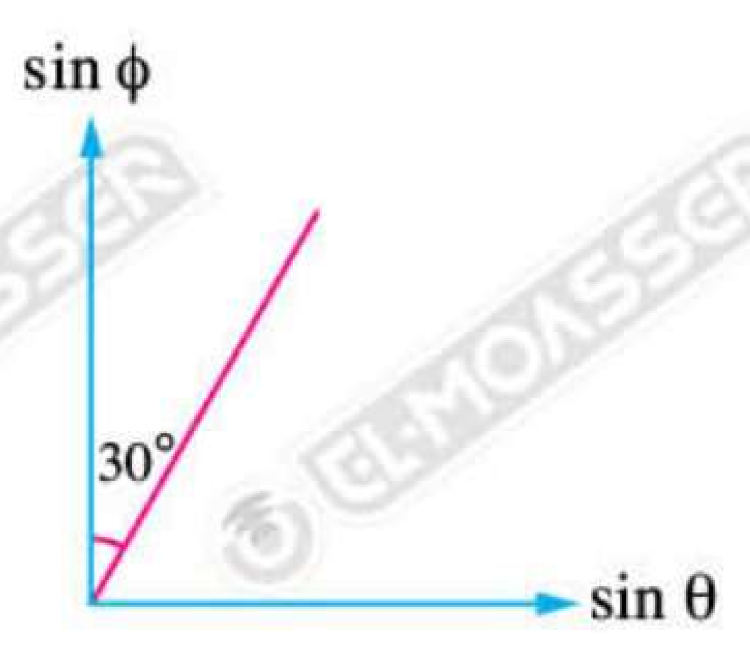


15 The following figure shows a palm tree, but we see the image inverted, so the order of the refractive indices of air layers is ....



ⓐ $n_1 > n_2 > n_3$ ⓑ $n_1 = n_2 = n_3$ ⓒ $n_1 < (n_2 = n_3)$ ⓓ $n_1 < n_2 < n_3$

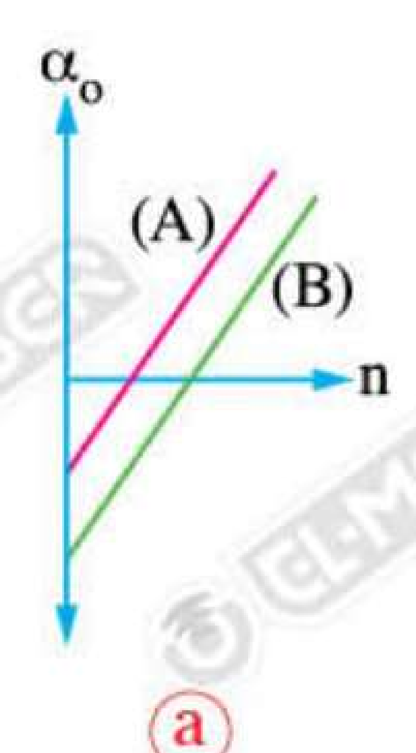
16 The opposite graph shows the relation between the sine of the incidence angle (sin ϕ) and the sine of the refraction angle (sin θ) of a light wave when travels from air to another medium, so the ratio between the wavelength of the light in air and its wavelength in the medium is equal to ....



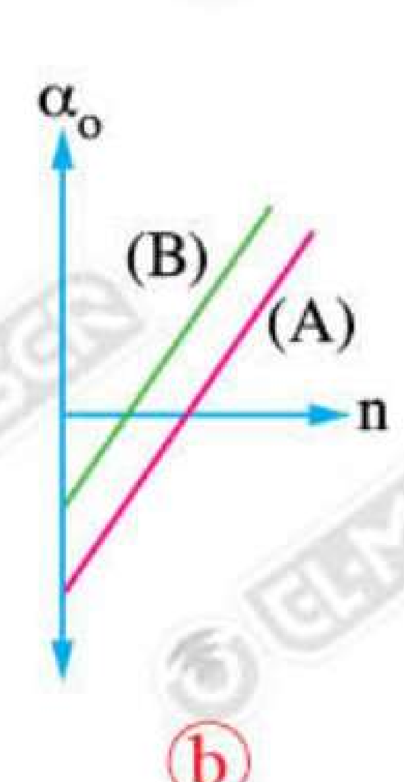
ⓐ $\frac{1}{2}$ ⓑ $\frac{2}{1}$

ⓒ $\sqrt{3}$ ⓓ $\frac{1}{\sqrt{3}}$

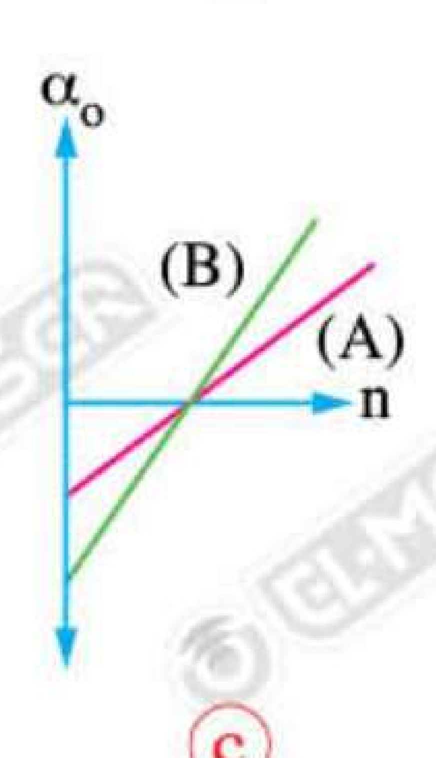
17 When a group of thin prisms (A) of the same apex angle is replaced by another (B) of smaller apex angle, the correct graphical relationship between the minimum angle of deviation and the refractive index is ....



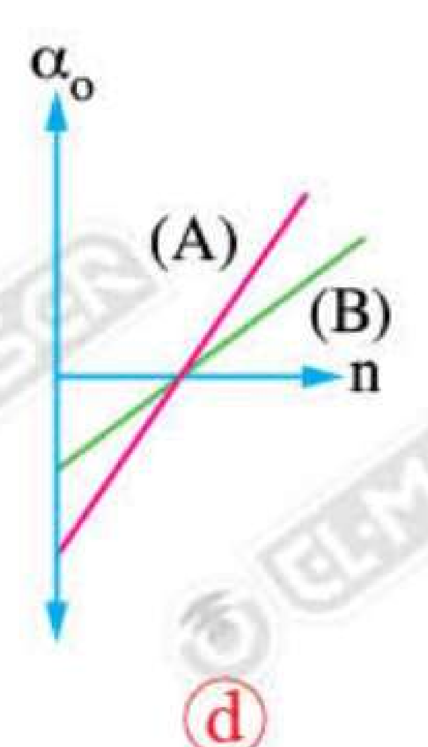
ⓐ



ⓑ



ⓒ

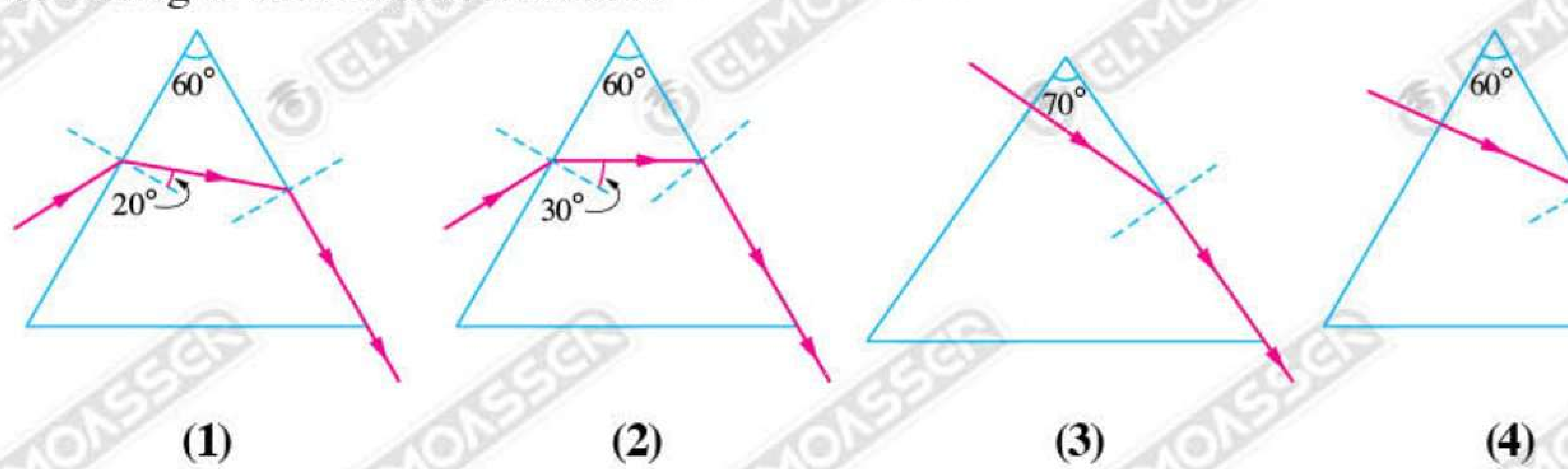


ⓓ

18 Two parallel light rays, one is blue and the other is green, fall on a separating surface from a medium of greater optical density to a medium of less optical density, if the refraction angle of the green ray is 90°, then the blue ray is ....

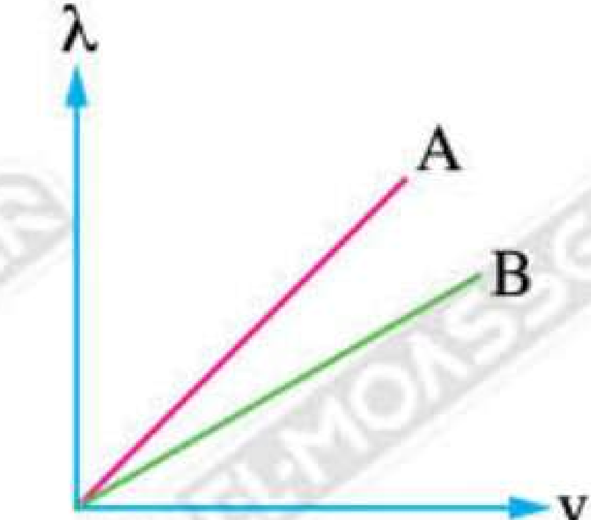
ⓐ refracted toward the normal
ⓑ passed without any refraction
ⓒ refracted away from the normal
ⓓ reflected totally

19 The following figures show four glass prisms of different materials, so they are arranged according to the refractive index as ....



ⓐ 1 < 3 < 2 < 4
ⓑ 3 < 4 < 1 < 2
ⓒ 2 < 3 < 4 < 1
ⓓ 1 < 2 < 4 < 3

20 The opposite graph shows the relations between the speeds (v) of two different waves (A and B) and their wavelengths (λ) when they propagate through different media, so ....



ⓐ $\upsilon_A < \upsilon_B$
ⓑ $\upsilon_A > \upsilon_B$
ⓒ $\lambda_A = \lambda_B$
ⓓ $\lambda_A < \lambda_B$

Second : Answer the following questions (21 : 24) :

21 The opposite figure shows a wave, its frequency is 50 Hz, **calculate** the time required for the wave to pass between the two points A, B.

....

....

....

d (m)
A
B
t (ms)

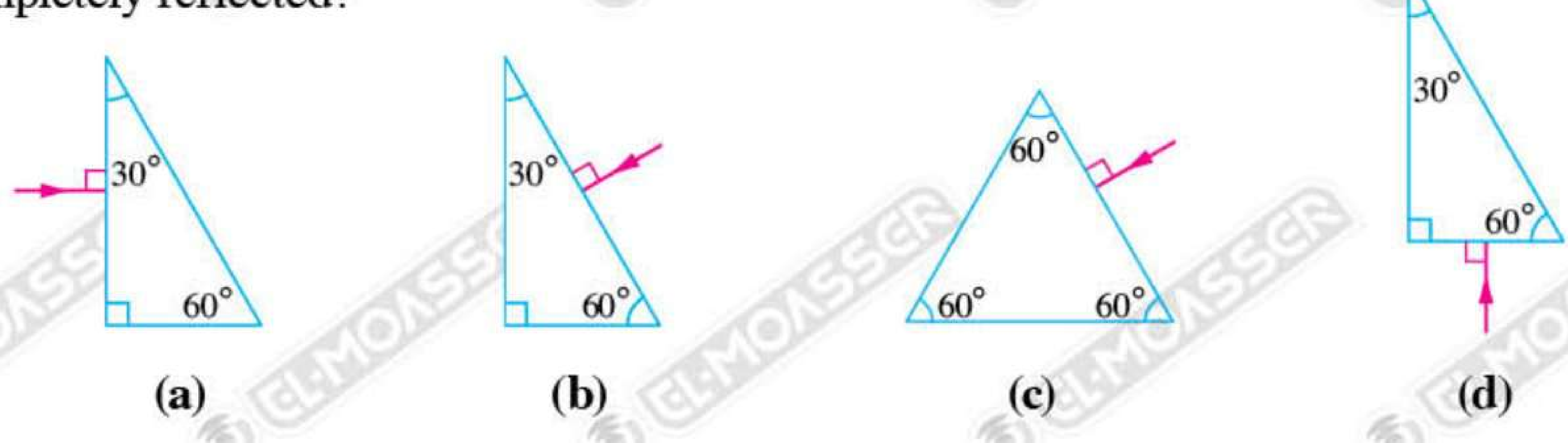
22 In the opposite figure, a light ray falls from medium (a) on the surface separating medium (b) and deviates from its original path by an angle of 30°. **Calculate** the relative refractive index between the two media ($_an_b$).

....

....

....

23 If you know that : n_{glass} = 1.5, **which** of the following shapes causes the incident ray to be completely reflected?



(a) **(b)** **(c)** **(d)**

24 Water flows steadily in a tube that is branched into several identical branches, if the diameter of the main tube is 8 times as large as the diameter of one of the branches and the speed of the water flow in the branch is 4 times as large as its speed in the main tube, **calculate** the number of the branches.

....

....

....

....

Final Exam 7

Assiut Governorate
«Al Qusiyyah Directorate»

First : Choose the correct answer (1 : 20) :

1 If the time interval between the second crest to the tenth trough in a transverse wave is 0.1 sec., then the frequency is ....

(a) 80 Hz (b) 85 Hz (c) 100 Hz (d) 60 Hz

2 A light ray falls normal to one of the faces of an equilateral triangular prism. So the second angle of incidence (ϕ_2) equals ....

(a) 30° (b) 45° (c) 60° (d) 90°

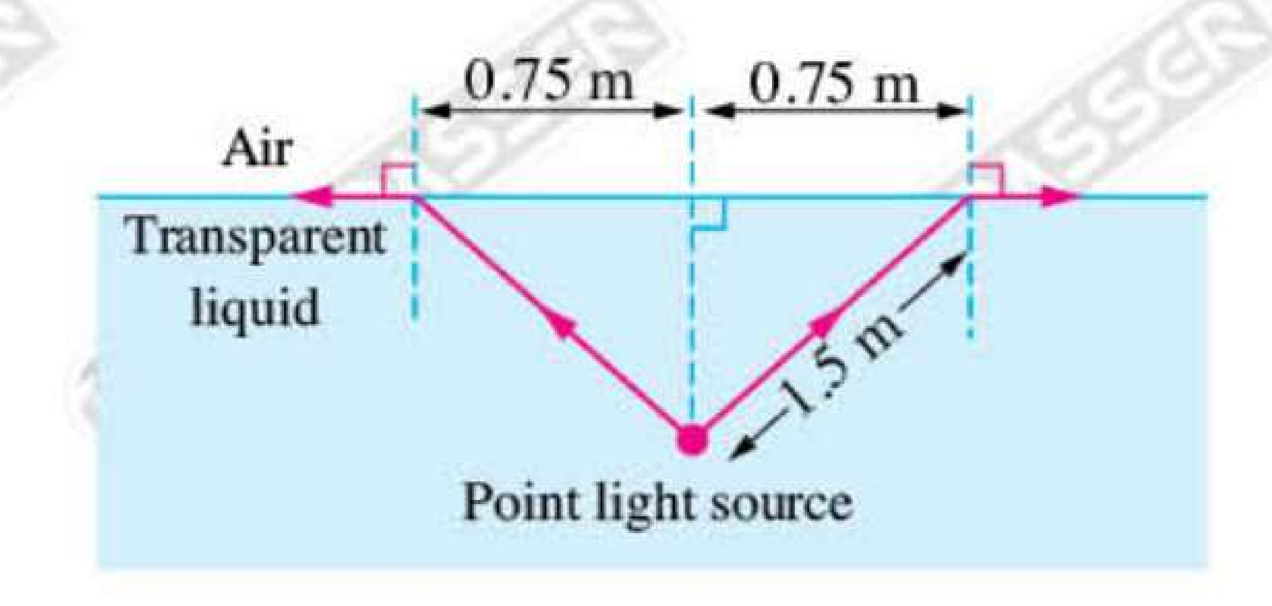
3 The light ray that has the largest critical angle when it travels from water to air is the .... ray.

(a) violet (b) blue (c) yellow (d) green

4 Water flows steadily with a speed of 0.3 m/s in a tube to fill a tank of volume 30 m^3 within 15 min., so the cross-sectional area of the tube equals ....

(a) 0.11 m^2 (b) 1 m^2 (c) 6.67 m^2 (d) 60 m^2

5 The opposite figure show light rays that are produced from a point light source placed in a transparent liquid. So, the refractive index of this liquid is ....



(a) 1.1 (b) 2.2

(c) 1.5 (d) 2

6 The ratio between the first angle of incidence and the angle of emergence of a light ray that falls on one of the faces of a triangular prism which is at the minimum deviation position, is ....

(a) greater than one (b) less than one (c) equal to one (d) indeterminable

7 The following measuring units are equivalent to each other except ....

(a) $kg.m^2/s^2$ (b) $N.s/m^2$ (c) $J.s/m^3$ (d) kg/m.s

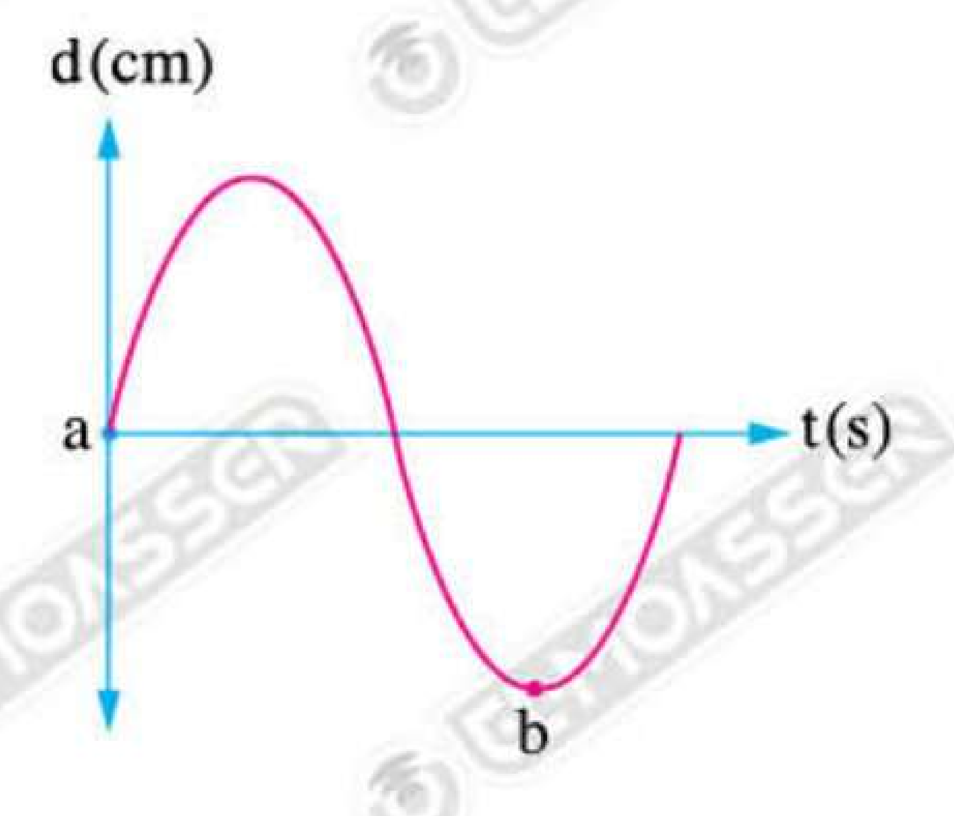
8 What is the path difference between the two rays coming from the two slits to the first dark fringe in Young's experiment?

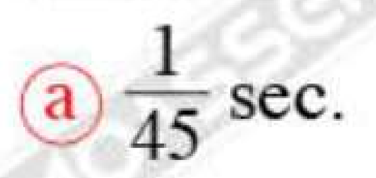
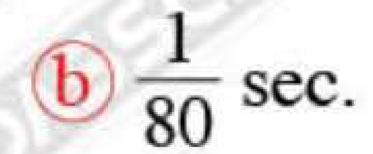
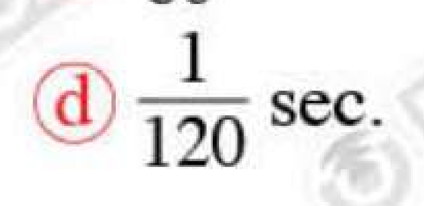
(a) λ (b) 2λ (c) 0 (d) $\frac{\lambda}{2}$

9 White light falls on the face of a thin prism, which has refractive index of 1.6 and 1.5 for blue light and red light respectively, so the dispersive power of the prism equals ....

(a) 0.039 (b) 0.024 (c) 0.65 (d) 0.18

10 The displacement-time graph for an oscillating pendulum is shown in the opposite figure. If the frequency of the pendulum is 60 Hz. What is the time interval between points a and b ?




(a) $\frac{1}{45}$ sec.

(b) $\frac{1}{80}$ sec.
(c) $\frac{1}{60}$ sec.

(d) $\frac{1}{120}$ sec.

11 A sound source produces 60 vibrations within 1.5 sec. and the produced wave propagates in air with a speed of 340 m/s, then the distance between the center of a compression and successive rarefaction equals ....

(a) 2.8 m (b) 4.25 m (c) 5.67 m (d) 8.5 m

12 Water flows steadily in a tube, if the ratio between the diameter of its ends is $\frac{2}{3}$, then the ratio between the mass flow rates of water in them respectively is ....

(a) $\frac{2}{3}$ (b) $\frac{4}{9}$ (c) $\frac{1}{1}$ (d) $\frac{3}{2}$

13 The result of multiplication of frequency and the square of periodic time = ...

(a) zero (b) one
(c) reciprocal of frequency (d) half periodic time

14 All the following are from the factors that affect the absolute refractive index except ....

(a) velocity of incident light (b) type of medium
(c) wavelength of incident light (d) temperature

15 At minimum deviation, the angle of refraction (θ_1) is equal to ....

ⓐ apex angle
ⓑ half apex angle
ⓒ double apex angle
ⓓ angle of emergence

16 A light ray falls on one face of a triangular prism of refractive index $\sqrt{2}$ at an angle of 45° and emerges from the opposite face at angle of 45°. Then the apex angle of the prism is ....

ⓐ 45°
ⓑ 60°
ⓒ 72°
ⓓ 80°

17 The critical angle between two media is given by the relation; $\sin \phi_c = \frac{n_2}{n_1}$ ....

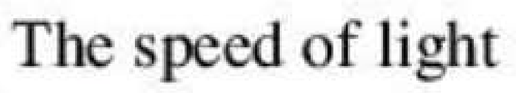
ⓐ $n_2 < n_1$
ⓑ $n_2 > n_1$
ⓒ $n_2 = n_1$
ⓓ the speed of light is the same in the two media

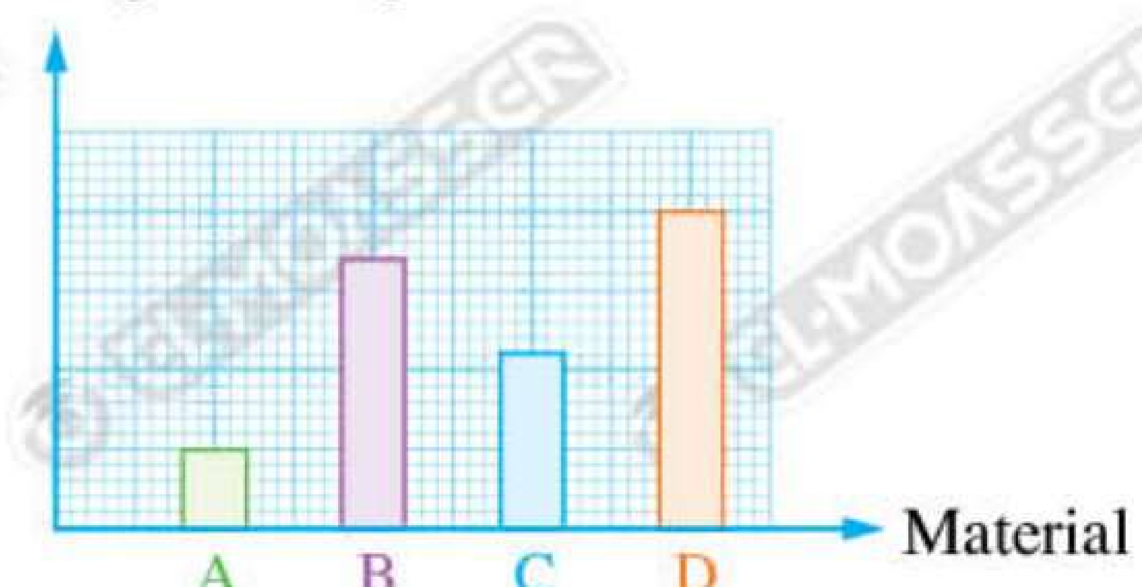
18 What is the largest angle of refraction of a light ray travelling from a glass of refractive index 1.6 into air?

ⓐ 63°
ⓑ 90°
ⓒ 29°
ⓓ 38.68°

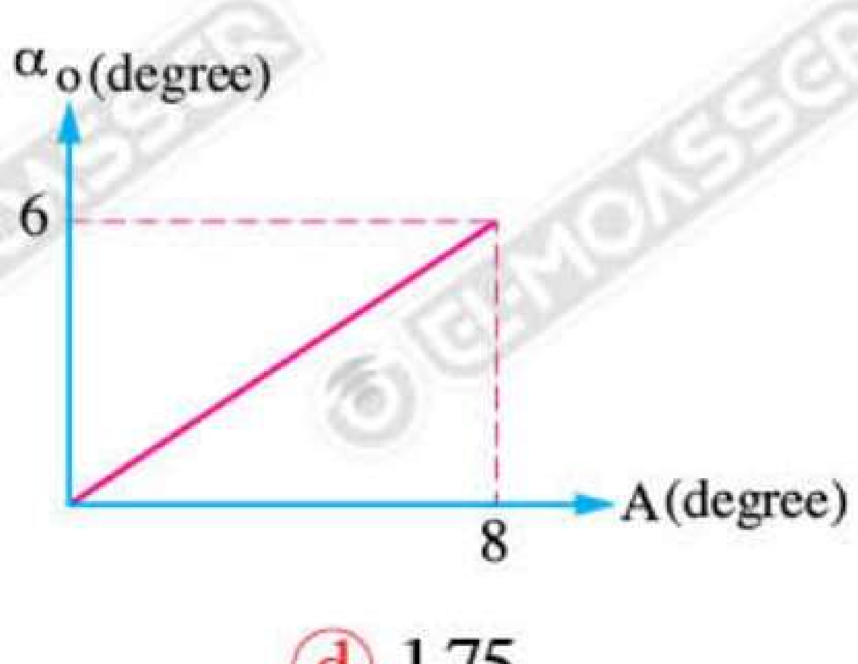
19 The opposite figure show the speed of light in four media A, B, C, D, then the optically denser material is ....

ⓐ material A
ⓑ material B
ⓒ material C
ⓓ material D





20 The opposite graph show the relation between the apex angles (A) of several thin prisms that are made of the same material and the angle of deviation (α_o) of a light ray through each of them, so the refractive index of the prisms material is ....





ⓐ 1.3   ⓑ 1.4   ⓒ 1.5   ⓓ 1.75

Second : Answer the following questions (21 : 23) :

21 A liquid of viscosity 0.55 $N.s/m^2$ separates two flat metal plates. The separation distance between them is 5 mm. The top metal plate with a surface area of 750 cm^2 is sliding with a velocity of 0.5 m/s. If the second plate is static, **find** tangential force acting on the sliding plate.

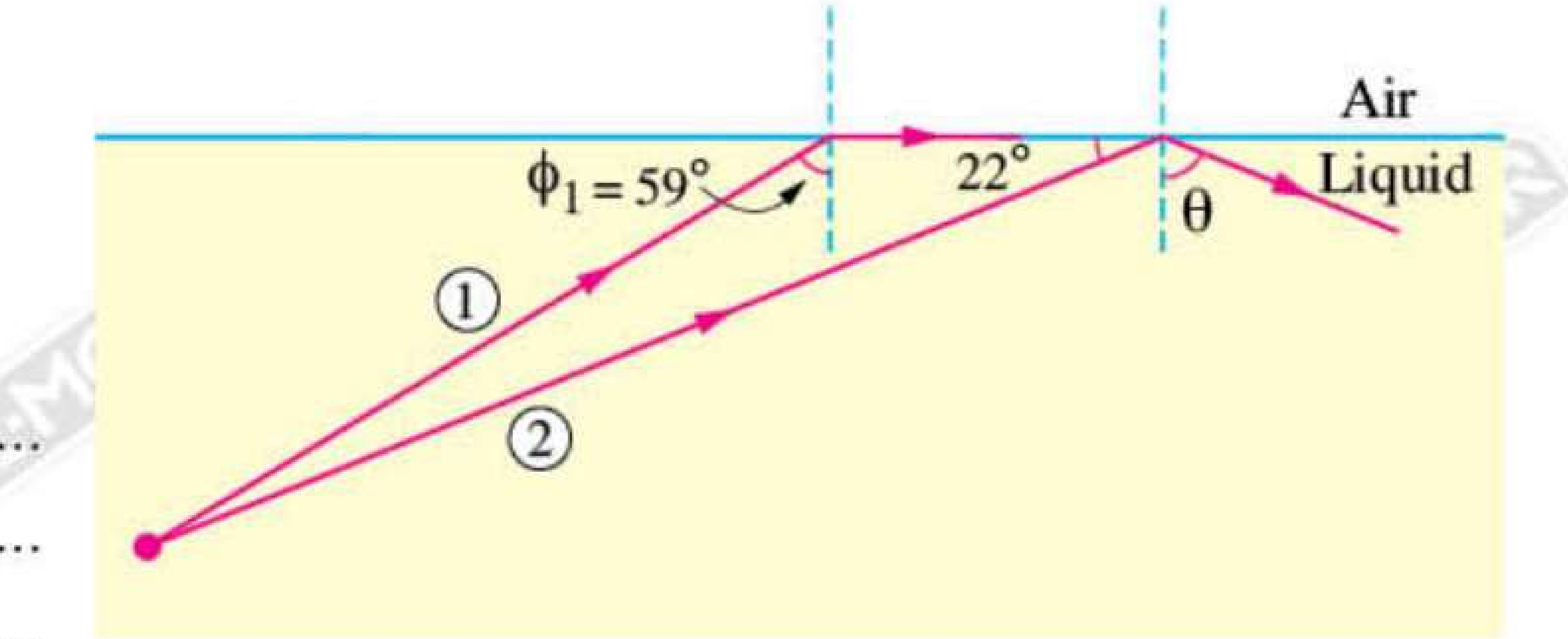
....

....

....

....

22 The opposite figure shows light rays that falls from a liquid on the interface with air, **calculate:**



(a) The value of (θ).

....

....

....

(b) The second ray undergoes total internal reflection. **Explain**.

....

....

....

23 In a rainy day, a boy noticed that he saw the lightning before hearing the thunder, **explain this observation**.

....

....

....

Final Exam 8



Qena Governorate

First : Choose the correct answer (1 : 20) :

1 If the periodic time of a vibration body is numerically equal to nine times of its frequency, then the time of the amplitude of the vibrating body is ....

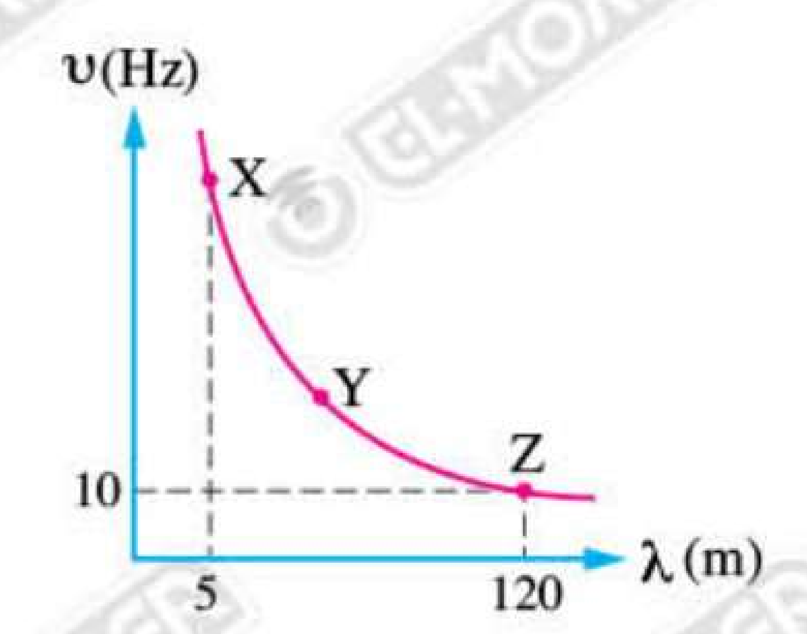
(a) 0.25 s (b) 3 s (c) 0.75 s (d) 1.5 s

2 The following figure shows a longitudinal wave propagating in a medium with frequency of 100 Hz, if the distance between X, Y is 100 m, so the wave velocity through this medium is ....



(a) 100 $m.s^{-1}$ (b) 2200 $m.s^{-1}$ (c) 3300 $m.s^{-1}$ (d) 4000 $m.s^{-1}$

3 The opposite figure shows the relation between frequency and wavelength of sound waves propagating in a medium, so :



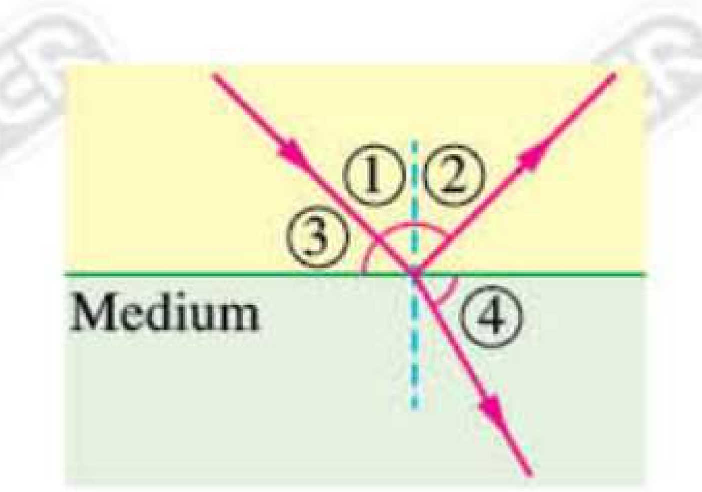
	The frequency of the sound wave X	The speed of the sound wave Y
(a)	230 Hz	1150 m/s
(b)	240 Hz	1200 m/s
(c)	240 Hz	1150 m/s
(d)	230 Hz	1200 m/s

4 The opposite figure shows a light ray falling on a reflecting surface, so :



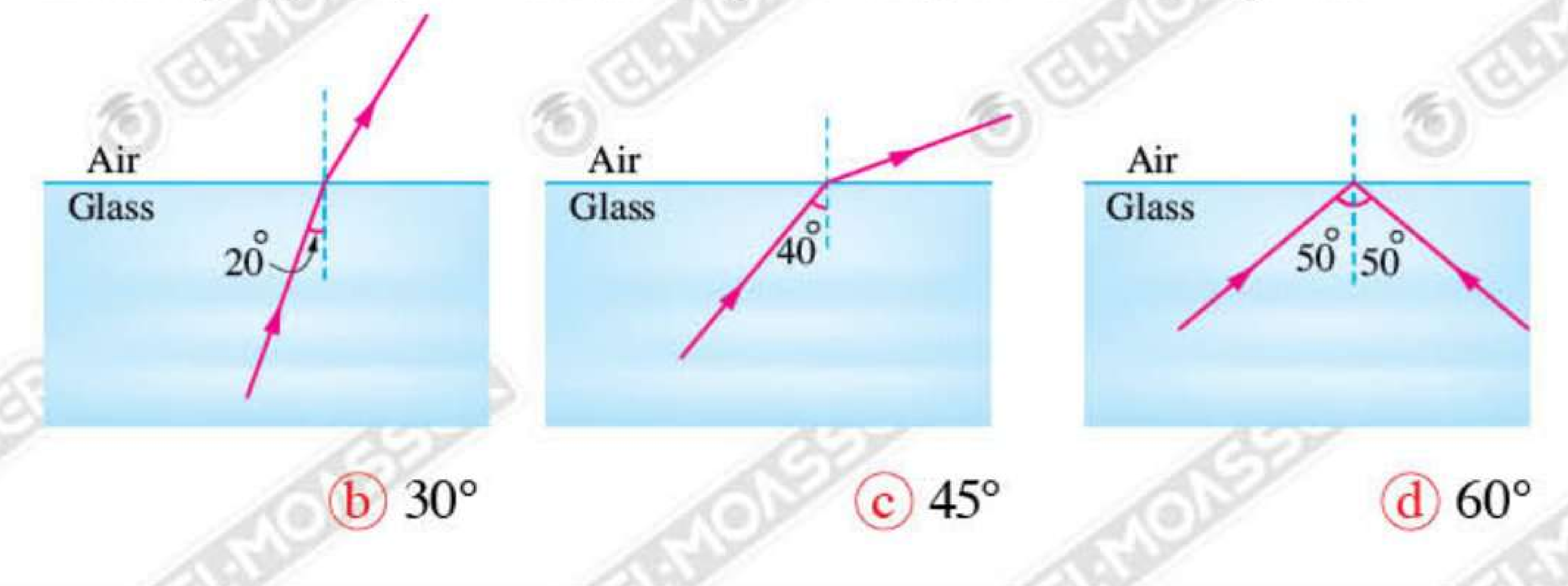
	The angle of reflection	The speed of the light wave
(a)	30°	decreases
(b)	60°	remains constant
(c)	30°	remains constant
(d)	60°	increases

5 In the opposite figure, a light ray falls from air, so :



(a)	Angle 1 = Angle 2	Angle 3 > Angle 4
(b)	Angle 1 > Angle 2	Angle 3 < Angle 4
(c)	Angle 1 < Angle 2	Angle 3 > Angle 4
(d)	Angle 1 = Angle 2	Angle 3 < Angle 4

6 From the following figures, the critical angle from glass to air might be ....



(a) 15° (b) 30° (c) 45° (d) 60°

7 If the absolute refractive index of water is $\sqrt{2}$, then the angle of incidence that lets a light ray pass from water to air equals ....

(a) 35° (b) 75° (c) 45° (d) 60°

8 If the refractive indices are (n_{water} = 1.33), (n_{glass} = 1.5), ($n_{diamond}$ = 2.46), then which of the previous media has a greater critical angle with respect to air?

(a) diamond (b) water (c) glass (d) indeterminable

9 If the speed of light in water is 2.3×10^8 m/s, then the angle θ in the opposite figure is equal to ....

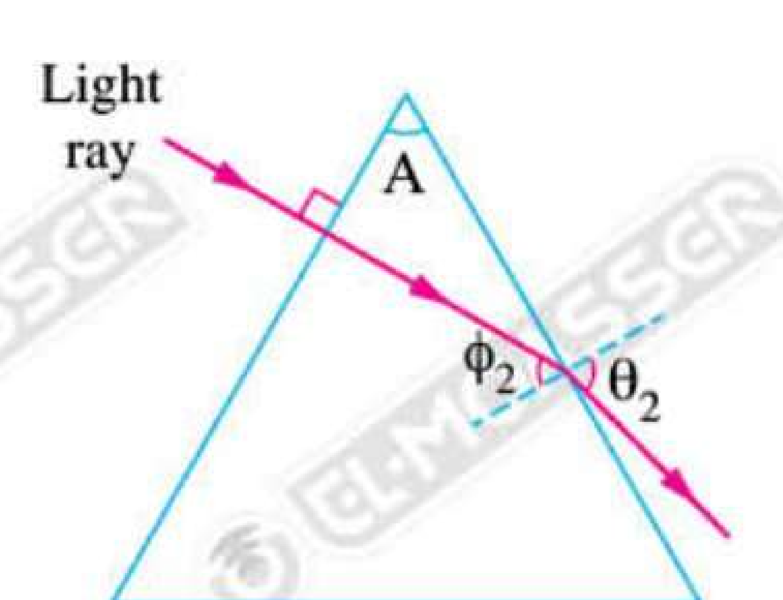
(Knowing that the speed of light in air is 3×10^8 m/s)

θ
Water




(a) 100° (b) 120° (c) 130° (d) 140°

10 In the opposite figure, ...

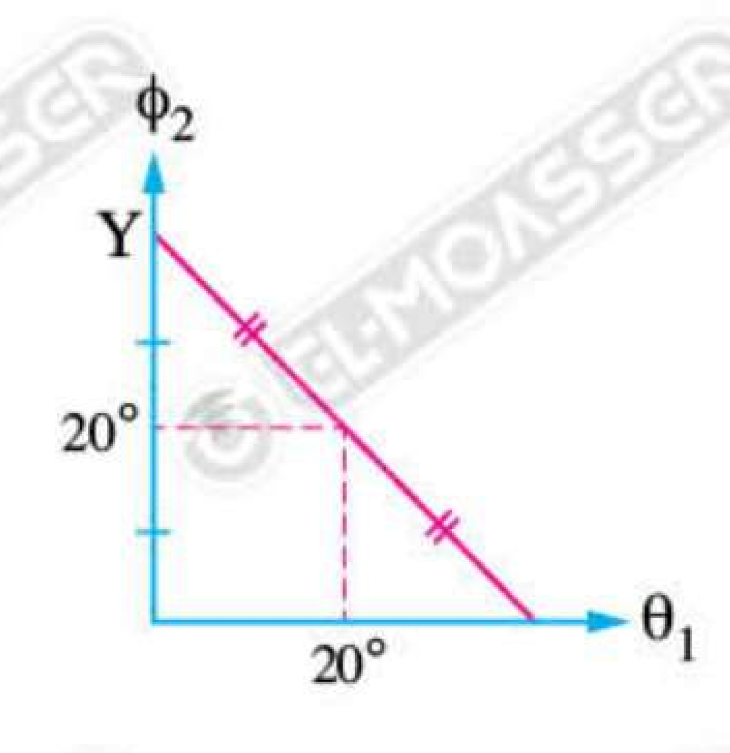




(a) $\phi_2 = \theta_2$ (b) $\theta_2 > A$

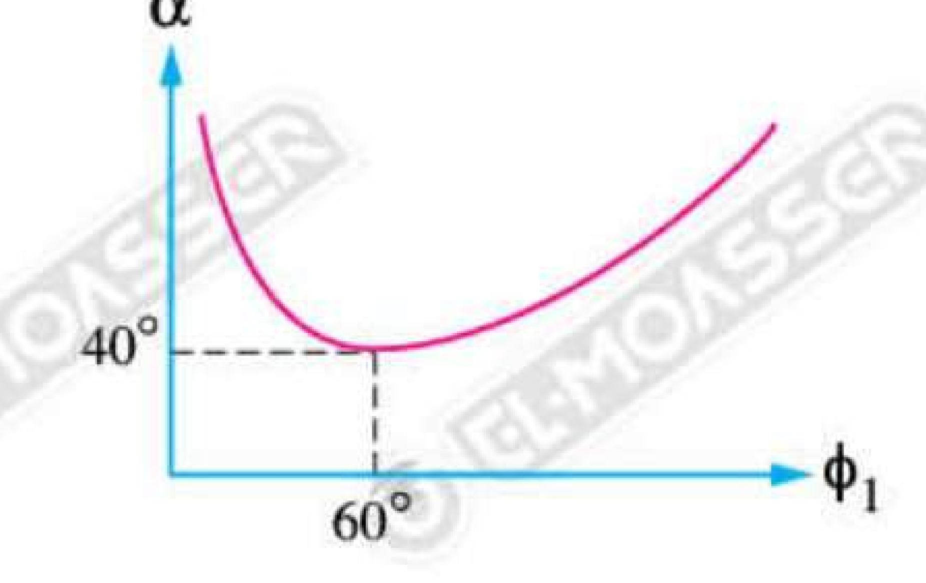
(c) $\theta_2 < A$ (d) $\phi_2 > \theta_2$

11 From the opposite graph of a prism whose refractive index is 1.5, which of the following choices expresses the point Y?



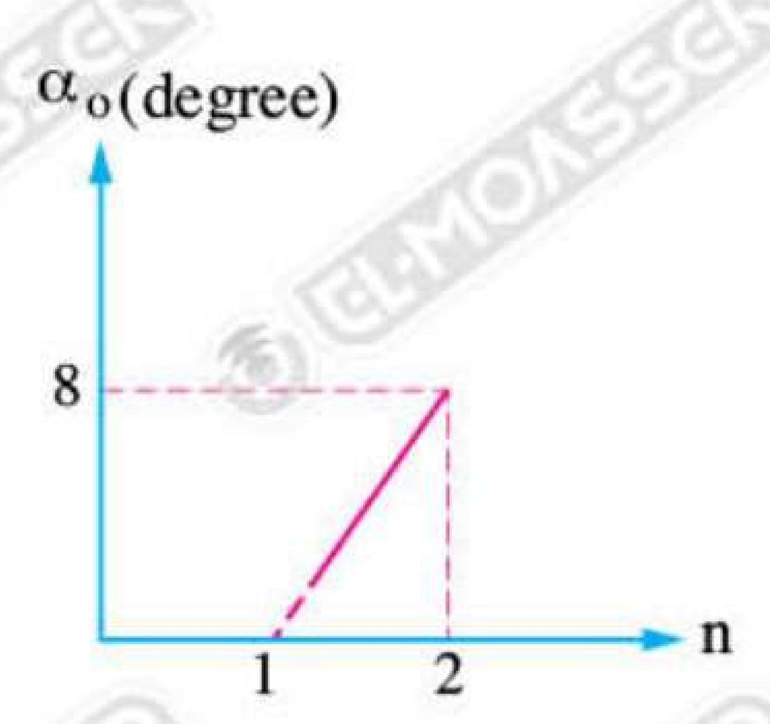
	Point Y represents	Its value
(a)	Apex angle	40°
(b)	The second angle of incidence at minimum deviation position	60°
(c)	The second angle of incidence at minimum deviation position	40°
(d)	Apex angle	60°

12 The opposite figure shows the relation between the angles of deviation of a light ray (α) and the angles of incidence (ϕ_1) of this light ray on one of the faces of a triangular prism, then the apex angle of the prism and its refractive index are ...., ... respectively.



(a) 80°, 1.45 (b) 60°, 1.5 (c) 80°, 1.35 (d) 70°, 1.5

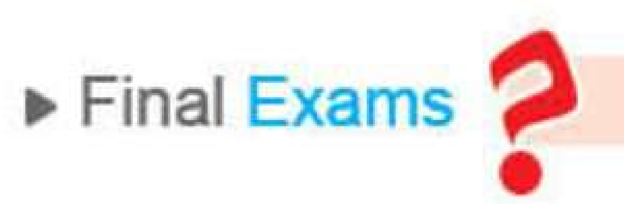
13 The opposite graph shows the relation between the angles of deviation of several thin prisms that have the same apex angle and the refractive indices of these prisms, then the apex angle of any one of them equals ....



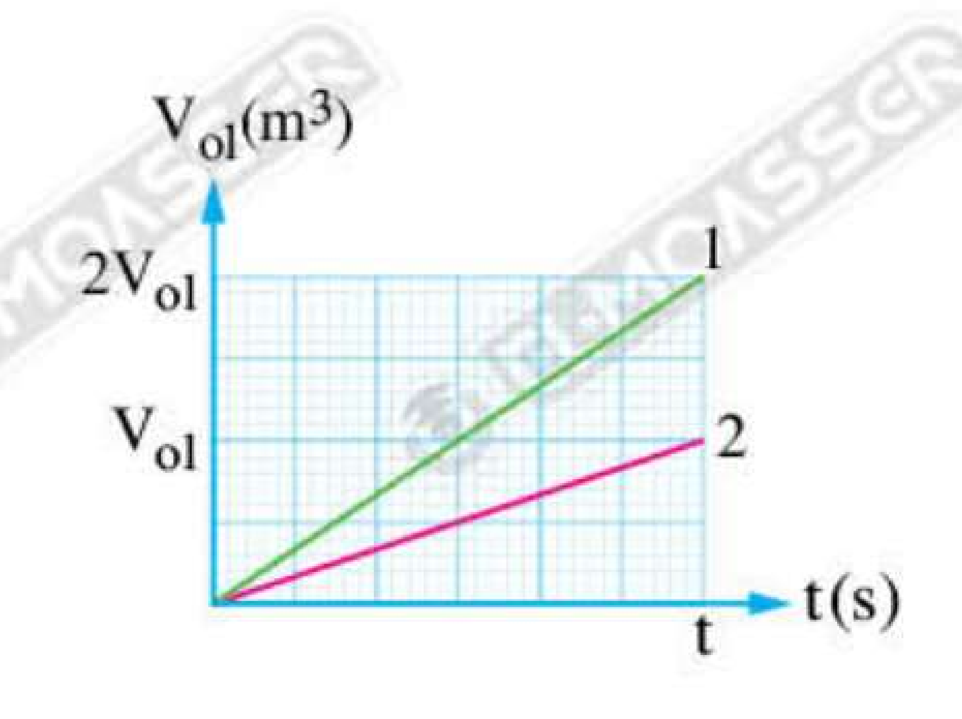
(a) 8° (b) 6°
(c) 4° (d) 10°

14 In Young's experiment that is carried out twice by using two different light sources in each, if the ratio between their wavelength $\frac{\lambda_1}{\lambda_2} = \frac{7}{8}$, the ratio of the distances between the centers of two consecutive fringes of the same type for the two light sources equals ....

(a) $\frac{7}{8}$ (b) $\frac{8}{7}$ (c) $\frac{49}{64}$ (d) $\frac{64}{49}$



15 The opposite graph represents the relation between the volume of a specific liquid that flows steadily through a tube with time for two different liquids 1 and 2, if the ratio between the densities of two liquids $\frac{\rho_1}{\rho_2} = \frac{3}{2}$, so the ratio between the mass flow rate of the two liquids $(\frac{Q_{m1}}{Q_{m2}})$ equals ....



ⓐ $\frac{3}{2}$ ⓑ $\frac{2}{1}$ ⓒ $\frac{3}{1}$ ⓓ $\frac{2}{3}$

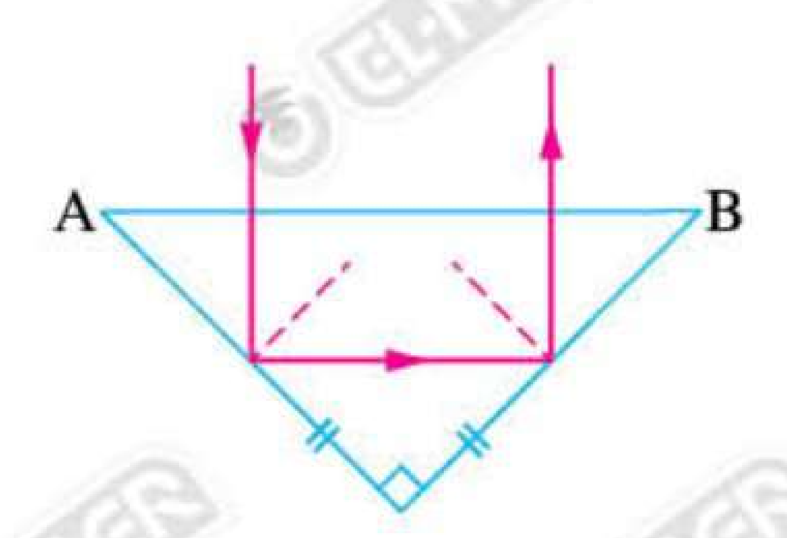
16 Four identical metallic balls are dropped from the same height into four similar cylinders that contain equal amounts of different liquids while the time that is taken by each ball to reach the bottom of the cylinder is recorded as the following table :

Cylinder	Time
1	0.2 s
2	0.3 s
3	0.6 s
4	1 s

Which cylinder contains the liquid with higher viscosity?

ⓐ Cylinder 1 ⓑ Cylinder 2 ⓒ Cylinder 3 ⓓ Cylinder 4

17 In the prism shown in the figure, if a light ray falls on face AB, it emerges from the same face parallel to the incident ray, so for the prism to perform its function the value of the refractive index of the prism's material should be not less than ....



ⓐ 1.8 ⓑ $\sqrt{2}$ ⓒ 1.5 ⓓ $\sqrt{3}$

18 When the angle of incidence changes from 60° to 30°, the angle of refraction will change from 45° to ....

ⓐ 22.5° ⓑ 15° ⓒ 24° ⓓ 23°

19 Water flow rate in a tube is 20 liters per minute. If the diameter of the tube is 1 cm, then the water speed while emerging from the tube = ...

(a) 4.24 m/s (b) 1.1 m/s (c) 2.24 m/s (d) 5.2 m/s

20 A tangential force between two layers of liquid, if this force is doubled, then the viscosity coefficient of liquid ....

(a) decreases to its half
(b) increases to the double
(c) doesn't change
(d) decreases to its quarter

Second : Answer the following questions (21 : 23) :

21 In the opposite graph:

A wave of frequency 50 Hz, **calculate** the time interval between the points **x**, y.

....

....

....

22 In the opposite figure :

Equilateral triangular prism, its refractive index is 1.5, a light ray is incident perpendicular on one of the prism faces. Trace the path of the light ray till it emerges and **find** the angle of emergence of the light ray.

....

....

....

23 **Why** does the diamond shine more than the glass?

....

....

....

....

Answers of Final Exam 1

Cairo Governorate
«Rod El-Farag Directorate»

1. (b) total internal reflection
2. (b) 3, 0.8, 1.25
3. (c) 16 v
4. (b) 1.3
5. (a) 1.5
6. (a) 45 Hz
7. (c) $\frac{1}{1}$
8. (a) 8.85×10^{-8} s
9. (d) 0.05 m
10. (a) greater than one
11. (b) Liquid in jar (C) has the largest viscosity.
12. (d) 80°, 1.35
13. (d) 10
14. (b) 24°
15. (d) Apex angle, 40°, First angle of refraction in state of minimum deviation, 20°
16. (a) 5000 Å
17. (c) 52.4°
18. (d) 15°
19. (b) increasing the distance between the two slits and screen
20. (d) frequency
21. $\sin \phi_c = \frac{1}{1.49}$

$\therefore \phi_c = 42.16°$

$\because \phi_2 = 45°$

$\therefore \phi_2 > \phi_c$

$\therefore$ The ray will undergo total internal reflection with an angle of reflection 45°, to emerge from the other right angled face at an angle of emergence of 0°.

22. Because the total cross-sectional area of blood capillaries is greater than the cross-sectional area of the major artery since the number of blood capillaries is very large.
23. The speed of the waves produced from the forks will be the same in air, so v = constant

$v_1 = v_2$

$\lambda_1 \upsilon_1 = \lambda_2 \upsilon_2$

$0.4 \times 850 = \mathbf{x} \times 170$

$\mathbf{x} = 2$ m



Answers of Final Exam 2 — Cairo Governorate «El Nozha Directorate»

1. (a) λ
2. (a) 0.577
3. (c) 0.01 m/s
4. (c) 35°
5. (a) 0.2×10^{-3} m
6. (c) red
7. (b) 60°
8. (c) $0.5\ \lambda$
9. (a) 5.67°
10. (c) 0.33
11. (b) 30°
12. (d) The angle of emergence
13. (b) decreases
14. (a) $\frac{1}{1}$
15. (a) 3.5 m/s
16. (c) 8 m/s
17. (a) less than one
18. (b) $\sqrt{2}$
19. (d) emerges tangent to that face
20. (c) $\frac{1}{1}$

21. $v_1 = \frac{0.2}{0.4} = \frac{1}{2}$ m/s

$v_2 = 2 \times \frac{1}{2} = 1$ m/s

$1 = \lambda_2 \upsilon_2 = \lambda_2 \times 10$

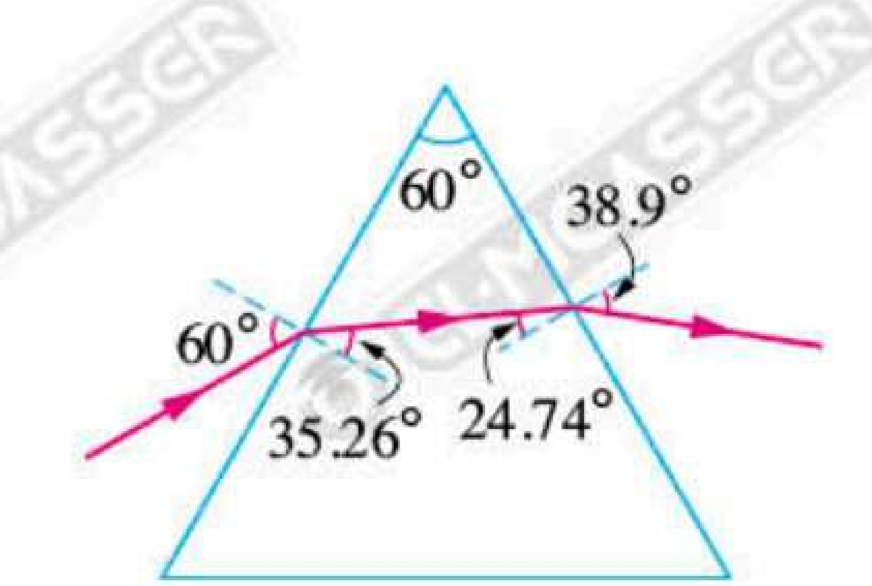
$\lambda_2 = \frac{1}{10} = 0.1\ \text{m} = 10\ \text{cm}$

22. $Q_v = Av = \pi r^2 v = \pi \left(\frac{2}{2} \times 10^{-2}\right)^2 \times 8 = 25 \times 10^{-4}\ \text{m}^3/\text{s}$

$Q_m = \rho_w Av = 25 \times 10^{-4} \times 1000 = 2.5$ kg/s

m (1 minute) $= 2.5 \times 60 = 150$ kg

23.



(a) $1.5 \sin \theta_1 = \sin 60$

$\theta_1 = 35.26°$

$\phi_2 = 60 - 35.26 = 24.74°$

$\sin \theta_2 = 1.5 \sin 24.74$

$\theta_2 = 38.9°$

(b) $\alpha = \phi_1 + \theta_2 - A = 60 + 38.9 - 60 = 38.9°$

Answers of Final Exam 3

Helwan Governorate
«El-Tebbin Directorate»

1. (c) 24°
2. (a) the frequency will increase
3. (a) 54°
4. (d) They require a medium in order to propagate.
5. (b) 45°
6. (d) 0.2 c
7. (b) less than α
8. (b) total internal reflection
9. (c) 12 : 3
10. (a) 1.41
11. (d) greater than 1
12. (b) 1.64
13. (b) the frictional force between the swimmer and water
14. (c) 2
15. (a) $F_C = F_{AC} + F_{BC}$
16. (d)
17. (b) 22.5°
18. (c) 6°
19. (a) 75°
20. (a) sixth
21. $v_1 = v_2$

$\lambda_1 \upsilon_1 = \lambda_2 \upsilon_2$

$\because \lambda_1 > \lambda_2$

$\therefore \upsilon_1 < \upsilon_2$

$\therefore \upsilon_2 = \upsilon_1 + 1.3$

$1500 \times 10^{-2} \times \upsilon_1 = 350 \times 10^{-2} (\upsilon_1 + 1.3)$

$\upsilon_1 = 0.4$

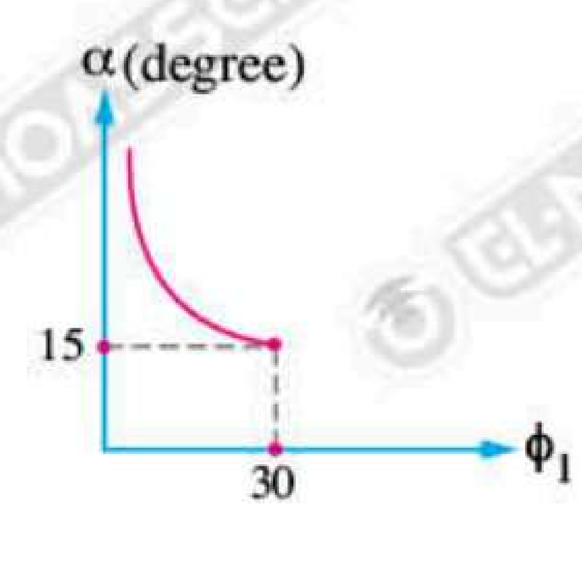
$v = 1500 \times 10^{-2} \times 0.4 = 6 \text{ m/s}$

22. higher
23. $Q_m = \rho Q_v$

$Q_v = \frac{0.5}{800} = 6.25 \times 10^{-4} \text{ m}^3/\text{s}$

$\Delta t = \frac{V_{ol}}{Q_v} = \frac{0.2}{6.25 \times 10^{-4}} = 320 \text{ s} = 5.33 \text{ minutes}$

24.





Answers of Final Exam 4 — Giza Governorate «Dokki Directorate»

1. (d) no displacement and maximum velocity
2. (c) 0°
3. (c) 90°
4. (d) 10^{-6} cm
5. (a) 0.9429
6. (b) less than 1
7. (c) remains constant
8. (a) 1
9. (a) $\frac{\alpha_o}{A} + 1$
10. (a) 2.1×10^8
11. (d) unchanged
12. (c) 40°
13. (b) angle of incidence = angle of reflection = 0°
14. (a) 1.33
15. (b) 4
16. (c) 6×10^{-7} m
17. (d) $\sqrt{3}$
18. (b) n
19. (b) 0.33
20. (b) total reflection
21. Because the blood precipitation rate depends on the terminal velocity of blood cells which in turns depends on the volume of the blood cells. In the case of rheumatic fever, blood cells adhere together so that the volume of each clustur becomes larger and the terminal velocity increases and the precipitation rate increases while in the case of anemia, red blood cells break down into smaller volumes so that their terminal velocity decreases and the precipitation rate becomes lower.
22. $\upsilon = \frac{0.75}{3} = 0.25$ Hz
23. ${}_1n_2 = \frac{\sin \phi}{\sin \theta} = \frac{\sin 50}{\sin 30} = 1.53$
24. To avoid any reflection losses on the faces of the prism.

Answers of Final Exam 5

Alexandria Governorate
«El-Agamy Directorate»

1 (c) in the second person is higher

2 (c) 5×10^{-7}

3 (c) $\frac{1}{2}$

4 (b) a

5 (b) $n \propto \frac{1}{\lambda}$

6 (a) It emerges decomposing into the seven colors of the spectrum.

7 (c) 1.37

8 (b) The distance between the fringes increases.

9 (b) 1.64

10 (d) remains constant

11 (b) Must be more than the critical angle.

12 (d) remains constant

13 (a) longitudinal in both air and spring

14 (b) Material (y) is used in the inner layer and material (**x**) is used in the outer layer.

15 (b) 70°

16 (a) 81°

17 (c) 30°

18 (d) 90°

19 (b) 1.6

20 (b) 15 m

21 As the speed of flow is directly proportional to the thickness of the liquid, the speed of water flow near the shore is low.

22 Because when the outside is dark, the amount of light passing from outside to inside is very small, so the person can see his image as a result of the reflection of the small amount of light reflected by the glass of the room's window and when there is light outside, the amount of light passing from outside to inside is larger than the amount of the reflected light, so it is difficult for the person to see his image by reflection.

23 $\upsilon = \frac{1}{10} = 0.1 \text{ Hz}$

24 At minimum deviation:

$\alpha_o = 20°$ then $\phi_1 = \theta_2 = 40°$

$A = (2)(40) - (20) = 60°$

$$n = \frac{\sin\left(\frac{20+60}{2}\right)}{\sin\left(\frac{60}{2}\right)} = 1.285$$



Answers of Final Exam 6

Menofia Governorate
«El-Shohadaa Directorate»

1. (a) $30°$
2. (b)
3. (d) $\frac{0.1}{(x-1)}$
4. (b) $30°$
5. (d) its speed decreases and it passes without any refraction
6. (d) the third dark fringe
7. (d) 2.8
8. (b) $\frac{1}{2}$
9. (a) higher for the first person
10. (b) $\frac{1}{7}$
11. (d) $\frac{1}{\sqrt{2}}$ s
12. (a) decreases by $0.94°$
13. (a) $T_1 > T_3 > T_4 > T_2$
14. (c) $\frac{1}{1}$
15. (d) $n_1 < n_2 < n_3$
16. (c) $\sqrt{3}$
17. (d)
18. (d) reflected totally
19. (b) $3 < 4 < 1 < 2$
20. (a) $\upsilon_A < \upsilon_B$
21. $T = \frac{1}{\upsilon} = \frac{1}{50} = 20$ ms

    $t_{AB} = \frac{3}{4} T = 15$ ms
22. $\because n_a < n_b$

    $\therefore$ The ray gets refracted towards the normal line.

    $\because \phi = 90 - 30 = 60°$

    $\therefore \theta = 60 - 30 = 30°$

    $\therefore {}_an_b = \frac{\sin 60}{\sin 30} = \sqrt{3}$
23. (c), (d)
24. $d_1 = 8\ d_2$

    $v_2 = 4\ v_1$

    $A_1 v_1 = n A_2 v_2$

    $d_1^2 v_1 = n d_2^2 v_2$

    $(8\ d_2)^2 v_1 = n d_2^2 \times 4\ v_1$

    $8^2 = 4\ n$

    $n = 16$

Answers of Final Exam 7

Assiut Governorate
«Al Qusiyyah Directorate»

1 (b) 85 Hz

2 (c) 60°

3 (c) yellow

4 (a) 0.11 m^2

5 (d) 2

6 (c) equal to one

7 (a) $kg.m^2/s^2$

8 (d) $\frac{\lambda}{2}$

9 (d) 0.18

10 (b) $\frac{1}{80}$ sec.

11 (b) 4.25 m

12 (c) $\frac{1}{1}$

13 (c) reciprocal of frequency

14 (a) velocity of incident light

15 (b) half apex angle

16 (b) 60°

17 (a) $n_2 < n_1$

18 (b) 90°

19 (a) material A

20 (d) 1.75

21 $\eta_{vs} = \frac{Fd}{Av}$

$F = \eta_{vs} \frac{Av}{d}$

$= 0.55 \times \frac{750 \times 10^{-4} \times 0.5}{5 \times 10^{-3}} = 4.125$ N

22

(a) $\theta = 90 - 22 = 68°$

(b) Since the first ray is refracted tangent to the boundary surface between the two media, so the critical angle of the liquid with air is 59°. The second ray falls on the surface with an angle of incidence (68°) which is greater than the critical angle so that it undergoes total internal reflection.

23 The speed of light in air is 3×10^8 m/s while the speed of sound in air is about 340 m/s. Which means that light travels a lot much faster than sound and of course we see the lightning before hearing the thunder.



Answers of Final Exam 8 — Qena Governorate

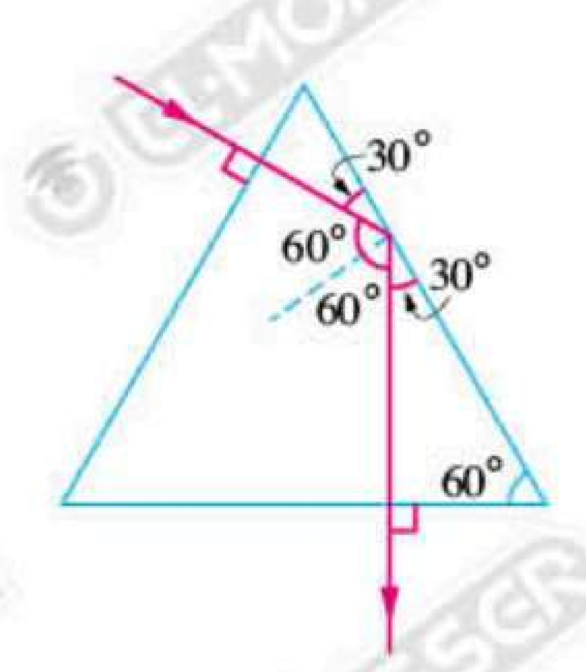
1. (c) 0.75 s
2. (d) 4000 $m.s^{-1}$
3. (b) 240 Hz, 1200 m/s
4. (b) 60°, remains constant
5. (d) Angle 1 = Angle 2, Angle 3 < Angle 4
6. (c) 45°
7. (a) 35°
8. (b) water
9. (d) 140°
10. (b) $\theta_2 > A$
11. (a) Apex angle, 40°
12. (c) 80°, 1.35
13. (a) 8°
14. (a) $\frac{7}{8}$
15. (c) $\frac{3}{1}$
16. (d) Cylinder 4
17. (b) $\sqrt{2}$
18. (c) 24°
19. (a) 4.24 m/s
20. (c) doesn't change
21. $T = \frac{1}{50} = 20 \times 10^{-3}$ s = 20 ms

    $t_{xy} = \frac{1}{4} T = \frac{20 \times 10^{-3}}{4} = 5 \times 10^{-3}$ s = 5 ms
22. $\sin \phi_c = \frac{1}{1.5}$

    $\phi_c = 41.8°$

    From the figure:

    The angle of emergence = 0°



23. Because it has a higher refractive index hence it has smaller critical angle that makes light rays undergo multiple internal reflections inside them causing diamond appears shiny.

امتحانات رقم (3)







General Exam 1



2024

First **Choose the correct answer (1 : 20)**

1 Which of the following is affected in the light wave when it is diffracted?

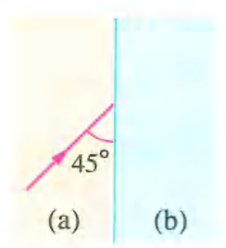
(a) Its frequency

(b) Its wavelength

(c) Its velocity

(d) Its propagation direction

2 In the opposite figure, a light ray falls from medium (a) at angle 45° on the separating surface with medium (b), where it deviates from its original path by an angle of 45°, so the relative refractive index between the two media ($_b n_a$) equals ....



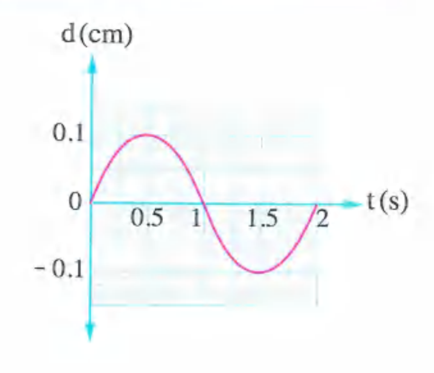
(a) $\sqrt{2}$

(b) $\frac{1}{\sqrt{2}}$

(c) $\frac{\sqrt{3}}{2}$

(d) $\frac{2}{\sqrt{3}}$

3 The opposite (displacement-time) graph represents a body that moves a simple harmonic motion, so ....



	The amplitude (cm)	The frequency (Hz)
(a)	0.1	4
(b)	0.05	2
(c)	0.1	0.5
(d)	0.05	0.25

4 A layer of a viscous liquid of thickness 3 cm and viscosity coefficient 1.2 kg/m.s is confined between two horizontal parallel plates. If a tangential force of 1.6 N acts on the upper plate to move it with a uniform speed of 1 m/s, then the area of the upper plate equals ....

(a) $0.02\ m^2$

(b) $0.03\ m^2$

(c) $0.04\ m^2$

(d) $0.05\ m^2$

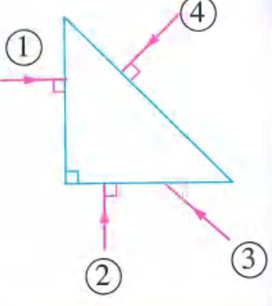
5. We don't hear the sound of explosions that happen in the Sun, because ....

(a) the location of the explosions is very far
(b) the sound propagates as transverse waves
(c) the sound propagates as electromagnetic waves
(d) the sound propagates as mechanical waves

6. If the angle of minimum deviation for a light ray that falls on one of the faces of an equilateral triangular prism is 60°, the refractive index of the prism material for the incident light equals ....

(a) $\sqrt{2}$ (b) 1.5 (c) 1.6 (d) $\sqrt{3}$

7. The opposite figure shows four light rays that fall on an isosceles triangular prism of refractive index 1.5, so which of these rays changes its direction by 180°?



(a) ① (b) ②
(c) ③ (d) ④

8. If red and blue light rays fall with the same angle of incidence ϕ on the separating surface from the optically rarer medium to an optically denser medium, then the ratio between the angle of refraction of red light and the angle of refraction of blue light $\left(\frac{\theta_r}{\theta_b}\right)$ in the optically denser medium is ....

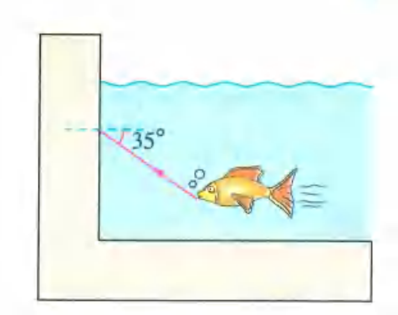
(a) greater than 1 (b) less than 1 (c) equal to 1 (d) indeterminable

9. The cross-sectional areas of the two ends of a tube are 0.005 m^2 and 0.01 m^2. If water flows through the tube steadily and the volume of the flowing water within 15 minutes is 9 m^3, then the speed of the water in ....

	The wide cross-section	**The narrow cross-section**
(a)	0.6 m/s	1.5 m/s
(b)	1 m/s	1.5 m/s
(c)	0.6 m/s	2 m/s
(d)	1 m/s	2 m/s

10 ✱ A plastic transparent plate of refractive index 1.5 is used to make an aquarium. If a light ray gets reflected from a fish inside the water and falls on the plastic plate at an angle of incidence 35° as in the opposite figure, therefore the emergence angle of the light ray to the air equals ....

(Knowing that: $n_{water} = 1.33$)

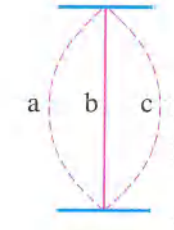


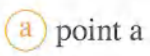
ⓐ 30.57° ⓑ 35.41° ⓒ 49.72° ⓓ 52.33°

11 In Young's double-slit experiment, a light ray falls on the double-slit where the distance between the two slits is 0.19 mm and they are 90 cm away from the observation screen. If the distance between the central fringe and the first bright fringe is 3×10^{-3} m, so the wavelength of the used light is ....

ⓐ 490 nm ⓑ 520 nm ⓒ 603 nm ⓓ 633 nm

12 The opposite figure represents the motion of a vibrating string, so the velocity of the string is maximum at ....





ⓐ point a ⓑ point b

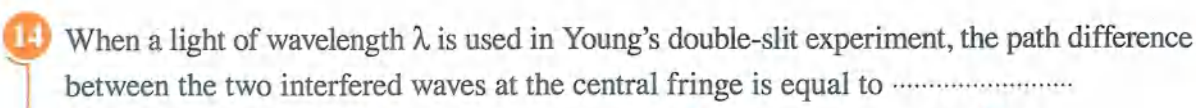
ⓒ points b and c ⓓ points a and c

13 Four identical solid balls are dropped from the same height into four cylinders, each of them contains the same volume of different liquid while the time taken by each ball to reach the bottom of the cylinder is recorded as the following table:

Cylinder	Time
1	0.2 s
2	0.3 s
3	0.6 s
4	1 s

Which cylinder contains the liquid of the highest viscosity?

ⓐ Cylinder 1 ⓑ Cylinder 2 ⓒ Cylinder 3 ⓓ Cylinder 4



14 When a light of wavelength λ is used in Young's double-slit experiment, the path difference between the two interfered waves at the central fringe is equal to ....

(a) $1.5\ \lambda$ (b) λ (c) $0.5\ \lambda$ (d) 0

15 A light ray falls on a mirror making an angle of 60° with its surface, therefore the reflection angle of the light ray from the mirror is equal to ....

(a) 30° (b) 60° (c) 90° (d) 120°

16 A blue light source is immersed under the surface of water at a certain depth to form blue light circular spot on the surface of water. If the blue light source is replaced by a red light source, then the light spot at the water surface ....

(a) vanishes (b) decreases in area

(c) keeps its area (d) increases in area

17 If the ratio between the apex angles of two thin prisms of the same material equals $\frac{2}{5}$, then the ratio between the dispersive powers of them respectively equals ....

(a) $\frac{1}{1}$ (b) $\frac{2}{5}$ (c) $\frac{5}{2}$ (d) $\frac{2}{3}$

18 If the volume flow rate of a liquid is Q_v in a pipe that is branched into four branches of equal cross-sectional areas, then the flow rate in each branch equals ....

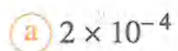
(a) $4\ Q_v$ (b) $\frac{1}{3}Q_v$ (c) Q_v (d) $\frac{1}{4}Q_v$

19 In the opposite figure, a tone of frequency 5000 Hz is produced due to the vibration of a guitar string, then the periodic time of the vibrating string in ms equals ....



(a) 2×10^{-4} (b) 5×10^{-4}

(c) 0.2 (d) 0.5



20 If a light ray falls on one of the faces of a triangular prism of apex angle 40° with an angle of incidence of 60° to emerge normally from the other face, then the refractive index of the prism equals ....

(a) 1.5 (b) 1.41 (c) 1.35 (d) 0.71



Second Answer the following questions (21 : 23)

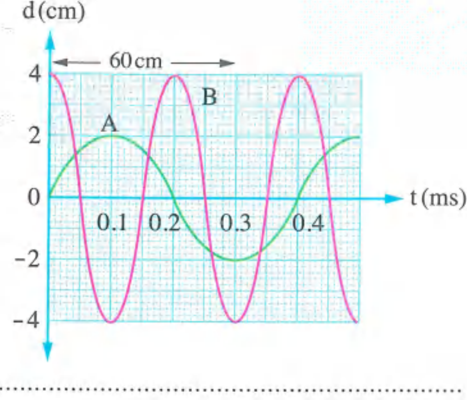
21 People in the high floors feel wind speed more than those in the lower floors. **Explain why?**

....

....

....

22 The opposite graph shows the relation between the displacement (d) and the time (t) for two waves A and B, **find** the speed of propagation of each wave in the medium.



....

....

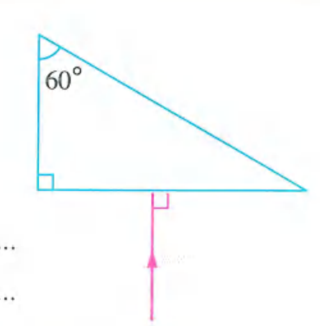
....

....

....

....

23 The opposite figure shows a light ray that falls on a triangular prism of refractive index 1.5, **trace** the path of the light ray in the prism, **then find** the angle of emergence from the prism.



....

....

General Exam 2



First **Choose the correct answer (1 : 20)**

1 Load is attached to a spring where it is in equilibrium, if the load is pulled vertically downwards for a distance 10 cm then it is left to pass by the equilibrium position for the first time after 0.5 s, then ....

	The amplitude of the vibration (cm)	The periodic time (s)
(a)	10	1.5
(b)	10	2
(c)	20	2
(d)	20	1.5

2 Water flows steadily in a tube of radius 3.5 cm at a speed 3 m/s, then the time required to fill a cubic tank of side length 226 cm approximately equals .... $(\pi = 3.14)$

(a) 900 s (b) 1000 s (c) 1100 s (d) 1200 s

3 If the critical angle of a light ray that transfers from medium (1) of refractive index 1.72 to medium (2) is 55°, then the refractive index of the material of medium (2) equals ....

(a) 1.41 (b) 1.48 (c) 1.53 (d) 1.56

4 A light ray falls on one of the faces of a thin prism of an apex angle 8°, refractive index for the blue light 1.664 and refractive index for the red light 1.644, then the dispersive power for the material of this prism equals ....

(a) 0.05 (b) 0.04 (c) 0.03 (d) 0.02

5 A light ray falls on one of the faces of a triangular prism of refractive index $\sqrt{2}$ at an angle of 45° and emerges from the opposite side at angle of 45°, then the apex angle of the prism is ....

(a) 45° (b) 60° (c) 72° (d) 80°



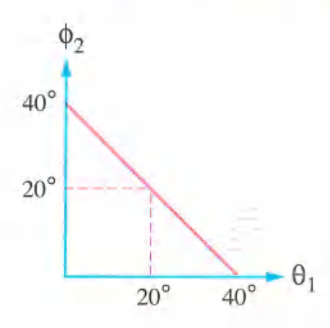
6 In Young's experiment, the distance between the center of the first bright fringe and the center of the central fringe is 2 mm, then the distance between the center of the third dark fringe and the center of the central fringe equals ....

(a) 2 mm (b) 5 mm (c) 6 mm (d) 7 mm

7 The ratio between the periodic time and the frequency of a tuning fork is $\frac{1}{65536}$ s^2, then the number of the vibrations that is produced in 10 seconds equals ....

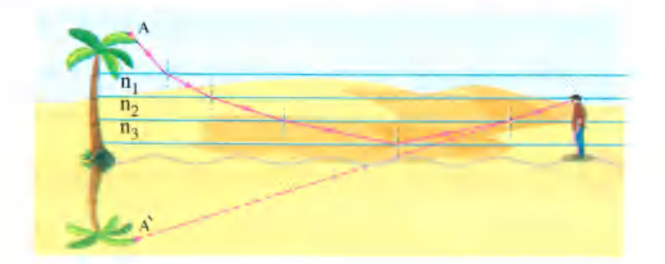
(a) 1636 vibrations
(b) 2560 vibrations
(c) 3160 vibrations
(d) 6320 vibrations

8 The opposite graph represents the relation between the first angle of refraction (θ_1) and the second angle of incidence (ϕ_2) when a light ray passes through a triangular prism. If the critical angle of the prism material is 41.8°, then the angle of minimum deviation for the falling light ray is ....



(a) 17.2°
(b) 21.7°
(c) 25.4°
(d) 30.2°

9 The opposite figure shows the occurrence of mirage, hence the correct order of the speeds of light in the three air layers is ....



(a) $v_1 > v_2 > v_3$
(b) $v_3 > v_1 > v_2$
(c) $v_3 > v_2 > v_1$
(d) $v_1 = v_2 = v_3$

10 A viscous liquid layer of thickness 2.5 mm is covering a ceramic floor. If a square plate of area 0.1 m^2 slides on the floor with uniform speed 0.5 m/s due to a tangential force of 35 N, then the coefficient of viscosity of the liquid equals ....

(a) 0.75 $N.s/m^2$ (b) 1.25 $N.s/m^2$ (c) 1.75 $N.s/m^2$ (d) 2.25 $N.s/m^2$

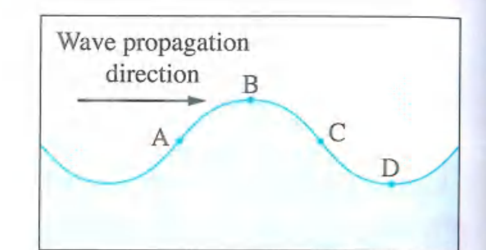
11 The critical angle between two different transparent media is given by the relation;

$\sin \phi_c = \frac{n_2}{n_1}$ and this means that ....

(a) $n_2 < n_1$ (b) $n_2 > n_1$

(c) $n_2 = n_1$ (d) speed of light is the same in the two media

12 The opposite figure shows a vertical section of a wave propagating through water from left to right, so at which two points the instantaneous vertical velocities of water particles are maximum?



(a) A, D (b) B, C

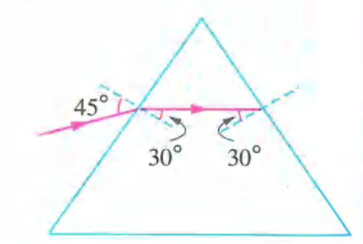
(c) A, C (d) C, D

13 In Young's double-slit experiment a blue light of wavelength λ is used to pass through two narrow slits that are at a distance d from each other, so interference fringes appear with a certain pattern on the observation screen that is at distance R from the slits. If the experiment is repeated under the surface of water, the distance between the centers of each two successive fringes will ....

(a) remain constant (b) decrease

(c) increase (d) be indeterminable

14 The opposite figure represents an equilateral triangular prism of refractive index $\sqrt{2}$, so the angle of deviation equals ....



(a) 30° (b) 45°

(c) 55° (d) 60°

15 Light rays fall on two thin prisms, the apex angle of the first prism is 9° and its refractive index equals 1.5 and the refractive index of the second prism equals 1.75. If the angle of deviation of the light rays in the two prisms is the same, then the apex angle of the second prism equals ....

(a) 6° (b) 7° (c) 8° (d) 9°

16 If the end of a spring coil is moved to make a longitudinal wave of wavelength 30 cm and periodic time 0.1 s then it is moved to make a transverse wave of periodic time 0.2 s that has the same speed as the longitudinal wave, then the wavelength of the transverse wave equals ....

(a) 7.5 cm (b) 15 cm (c) 30 cm (d) 60 cm

17 If the ratio of the angle of incidence of a light ray on the interface between glass and another medium to its angle of refraction in the other medium is less than one, then ....

(a) the absolute refractive index of glass is greater than the absolute refractive index of the other medium

(b) the absolute refractive index of glass is less than the absolute refractive index of the other medium

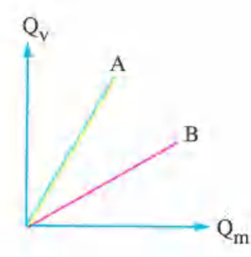
(c) the speed of light in glass is greater than the speed of the light in the other medium

(d) the wavelength of light in glass is greater than that in the medium

18 A light ray falls on one of the faces of a triangular prism with an angle of incidence ϕ and emerges from the opposite face with an angle of emergence $1.25\ \phi$ where the light ray deviates by an angle $0.75\ \phi$, then the ratio between the angle of deviation and the apex angle of the prism $(\frac{\alpha}{A})$ equals ....

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{2}{1}$ (d) $\frac{2}{5}$

19 The opposite graph represents the relation between the volume flow rate (Q_v) and the mass flow rate (Q_m) for the two liquids A and B that flow steadily inside many tubes, so the ratio between the densities of the two liquids $(\frac{\rho_A}{\rho_B})$ is ....



(a) greater than one (b) less than one

(c) equal to one (d) indeterminable

20 The electromagnetic waves for which the diffraction becomes more clearer when they pass through aperture of dimensions 10^{-5} m are ....

(a) X-rays (b) radio waves (c) gamma rays (d) UV waves

Second Answer the following questions (21 : 23)

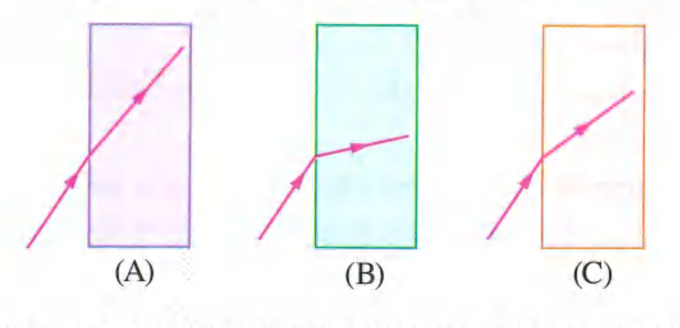
21 Honey flows faster in summer than in winter, **what** is the reason for this?

....

....

22 The following figures illustrate identical light rays getting incident from air into three different media (A), (B) and (C) with equal angles of incidence.

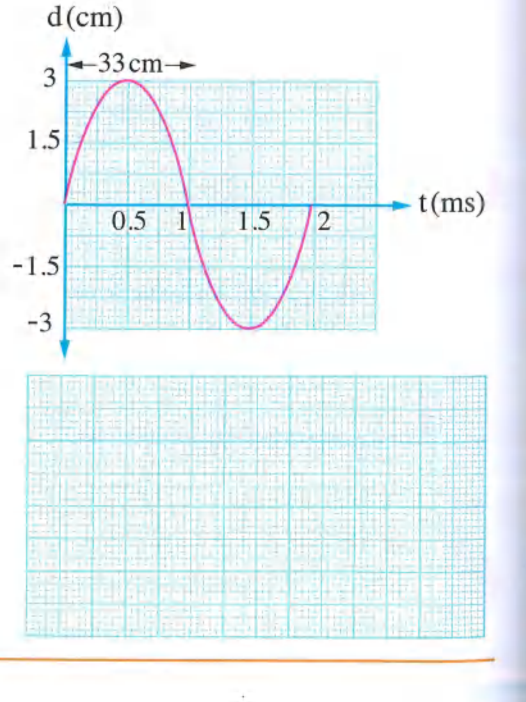
Arrange in an ascending order these media according to their refractive indices.



....

....

23 A sound wave that propagates in air has produced vibrations to the air particles where the opposite graph represents the relation between the displacement (d) of one of the air particles and time (t). **Draw** the relation between the displacement and the time with the same drawing scale for the vibration of one of the air particles that transmit a sound wave of half the wavelength of the first wave and half the amplitude of the first wave.



General Exam 3



First Choose the correct answer (1 : 20)

1 In Young's double-slit experiment a blue light of wavelength λ is used to pass through two slits where the distance between them is d, so interference fringes appear on the observation screen which is at a distance R from the slits. If another light of wavelength $1.5\ \lambda$ is used, then to have the same pattern of interference, the observation screen should be at a distance of .... from the slits.

(a) $\frac{R}{1.5}$ (b) $\frac{R}{0.75}$ (c) 0.75 R (d) 1.5 R

2 The speed of light in a transparent medium is 2×10^8 m/s and its speed in another transparent medium is 2.4×10^8 m/s, then the ratio between the sine of the critical angle of the first medium with air and the sine of the critical angle of the second medium with air $\left(\frac{\sin (\phi_c)_1}{\sin (\phi_c)_2}\right)$ equals ....

(a) $\frac{5}{6}$ (b) $\frac{6}{5}$ (c) $\frac{1}{2}$ (d) $\frac{2}{1}$

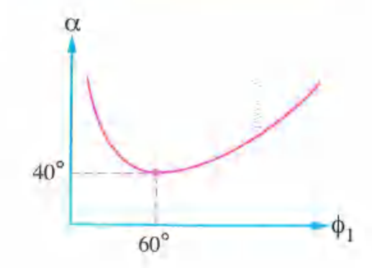
3 A wooden floor is covered with a layer of viscous liquid of thickness 2 mm where a rectangular plate of area $0.12\ m^2$ slides on it with velocity 0.75 m/s when it is affected by a tangential force of 126 N, then the viscosity coefficient of the liquid equals ....

(a) $1.6\ N.s/m^2$ (b) $1.8\ N.s/m^2$ (c) $2.4\ N.s/m^2$ (d) $2.8\ N.s/m^2$

4 A sound wave transfers from air to iron. If the ratio between the speed of sound in air and the speed of sound in iron is $\frac{3}{44}$ while the wavelength of that sound wave in air is 57.6 cm, then its wavelength in iron is ....

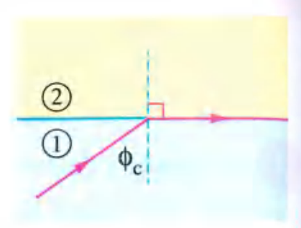
(a) 3.9 cm (b) 172.8 cm (c) 533.5 cm (d) 844.8 cm

5 The opposite graph shows the relation between the angle of deviation of a light ray (α) and the angle of incidence (ϕ_1) of this light ray on one of the faces of a triangular prism, then the apex angle of the prism and its refractive index are .... , ... respectively.



(a) 60°, 1.5 (b) 80°, 1.45
(c) 75°, 1.5 (d) 80°, 1.35

6 In the opposite figure, a light ray falls from medium (1) on the separating surface between the two media (1) and (2), therefore the light ray refracts tangent to the separating surface. If the ratio between the speed of light in medium (1) and that in medium (2) $(\frac{v_1}{v_2})$ equals 0.73, then the critical angle between the two media equals ....

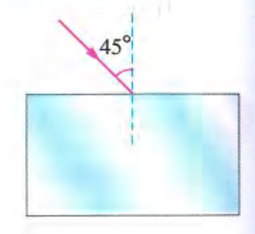


(a) 39.65° (b) 41.8° (c) 46.89° (d) 49.72°

7 The dispersive power of a thin prism depends on ....

(a) the angle of incidence of the beam on the prism
(b) the intensity of the incident light on the prism
(c) the apex angle of the prism
(d) the refractive index of the prism

8 ✱ The opposite figure shows a light ray that falls from air on a transparent glass plate at angle of 45°, therefore the emergence angle of the light ray from the glass plate, if the refractive index of its material is 1.52 equals ....



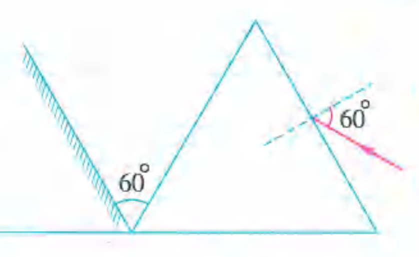
(a) 28° (b) 45°
(c) 49° (d) 53°

9 The opposite figure shows the motion of a simple pendulum of periodic time T, so which of the following statements is wrong?



(a) The speed of the load at x > The speed of the load at y
(b) The speed of the load at z = zero
(c) The amplitude = The distance between z and y
(d) The time taken by the load to cover the distance xy = $\frac{T}{4}$

10 ✻ A light ray falls on one of the faces of equilateral triangular prism of refractive index 1.5 with an angle 60° where the prism makes an angle 60° with a plane mirror as in the opposite figure, therefore the angle of its reflection from the surface of the mirror equals ....

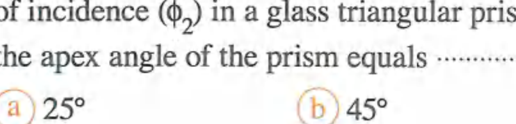


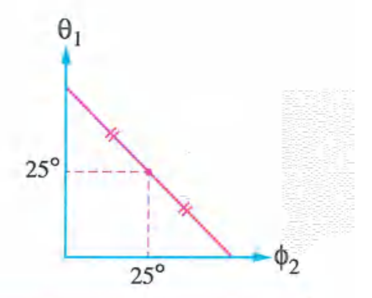
(a) 0° (b) 21.1° (c) 38.9° (d) 68.9°

11 A liquid flows steadily in tube x of cross-sectional area 26 cm^2 that is branched into two tubes y and z that have cross-sectional areas of 15 cm^2 and 7 cm^2 respectively. If the speed of the liquid in the tubes x and y are 0.4 m/s and 0.6 m/s respectively, so the speed of liquid flow in tube z equals ....

(a) 0.2 m/s (b) 0.3 m/s (c) 0.5 m/s (d) 0.7 m/s

12 The opposite figure represents the relation between the first angle of refraction (θ_1) and the second angle of incidence (ϕ_2) in a glass triangular prism, so the apex angle of the prism equals ....





(a) 25° (b) 45°

(c) 50° (d) 60°

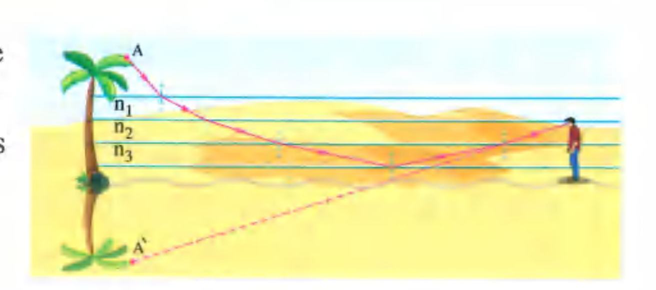
13 In the opposite figure, as the boat gets closer to the shore while keeping its speed constant, the athlete needs to ....



(a) row with a less force (b) row with a greater force

(c) row with the same force (d) stop rowing

14 The opposite figure shows the occurrence of mirage, hence the correct order for the wavelengths of light in the three air layers is ....



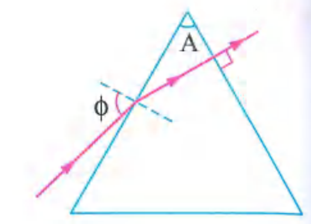
(a) $\lambda_1 > \lambda_2 > \lambda_3$

(b) $\lambda_3 > \lambda_2 > \lambda_1$

(c) $\lambda_3 > \lambda_1 > \lambda_2$

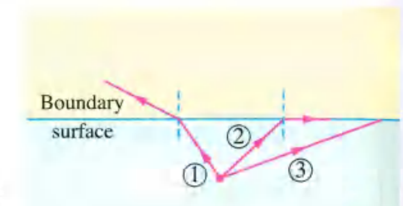
(d) $\lambda_1 = \lambda_2 = \lambda_3$

15 A light ray falls on one of the faces of a triangular prism and emerges normal to the opposite face as in the opposite figure, so the angle of incidence (ϕ) is ....



(a) greater than A
(b) less than A
(c) equal to A
(d) equal to (90 – A)

16 The opposite figure shows a light source that is placed inside a transparent medium, so what happens to ray ③ at the boundary surface between the two media?



(a) It gets refracted, because the angle of incidence is less than the critical angle between the two media
(b) It gets refracted, because the angle of incidence is greater than the critical angle between the two media
(c) It gets totally reflected, because the angle of incidence is less than the critical angle between the two media
(d) It gets totally reflected, because the angle of incidence is greater than the critical angle between the two media

17 Which of the following is correct when comparing between the refraction and the diffraction of light?
(a) The diffraction happens when light transfers from one medium to another while the refraction happens when light propagates in the same medium
(b) The diffraction happens when light propagates in the same medium while the refraction happens when light transfers from one medium to another
(c) Both of them happen when light propagates in one medium
(d) Both of them happen when light transfers from one medium to another

18 ❋ A light ray falls perpendicularly on one of the faces of a triangular prism of refractive index $\sqrt{2}$ to emerge tangentially to the opposite face, therefore the angle of minimum deviation of the light ray in the prism equals .... approximately.
(a) 18.5° (b) 20.5° (c) 25.5° (d) 35.5°



19 When a light wave transfers from one medium to another, the property that doesn't change for the light wave is the ....

(a) speed (b) wavelength (c) frequency (d) intensity

20 The factor(s) that affect the angle of deviation of the light ray in a triangular prism is (are) ....

(a) the apex angle of the prism
(b) the angle of incidence of the light ray
(c) the refractive index of the prism
(d) all the previous

Second Answer the following questions (21 : 23)

21 If water flows steadily with a speed of 1 m/s inside a tube of diameter 10 cm that ends with a nozzle of diameter 2.5 cm, **calculate** the mass of water that flows every minute through the nozzle of the tube.

(Knowing that: The density of water = 1000 kg/m^3, $\pi = 3.14$)

....

....

....

22 "Every vibrational motion is considered a periodic motion, but not every periodic motion is considered a vibrational motion", **show the validity of this sentence**.

....

....

....

23 In the following figure, **trace the path of** the incident light ray on mirror A until it gets reflected from mirror C.

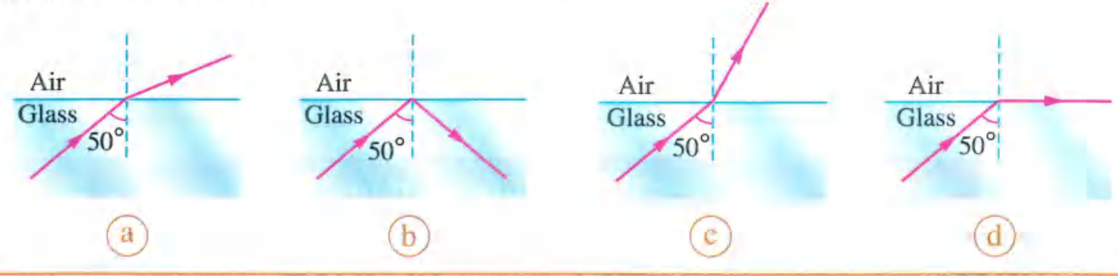
B
A
150°
120°
C
20°

General Exam 4



First Choose the correct answer (1 : 20)

1 If you know that the refractive index of glass is 1.5, then the figure which shows the right path of the light ray that falls on the separating surface between glass and air at angle of 50° is ....



(a) (b) (c) (d)

2 When light disperses into its components through a triangular prism, violet light will have greater deviation than red light because ....

(a) $n_{violet} < n_{red}$
(b) $\lambda_{violet} < \lambda_{red}$
(c) $\upsilon_{violet} < \upsilon_{red}$
(d) $v_{red} < v_{violet}$

3 A thin prism has average refractive index of 1.5 and the ratio between the refractive indices of the prism's material for blue and red lights $(\frac{n_b}{n_r})$ equals $\frac{23}{20}$, therefore the refractive index of prism's material for blue light (n_b) equals ....

(a) 1.4
(b) 1.5
(c) 1.6
(d) 1.7

4 A light ray falls at an angle ϕ on one of the faces of a triangular prism of apex angle 75° If the refractive index of the prism's material is $\sqrt{2}$ and the light ray emerges tangent to the opposite face of the prism, then the value of ϕ is ....

(a) 0°
(b) 30°
(c) 45°
(d) 60°

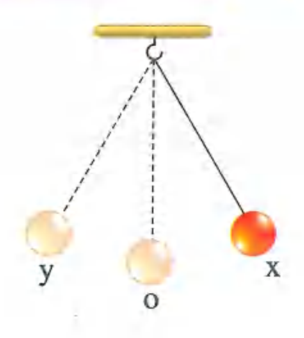
5 A patient is injected by a needle of radius 0.3 mm, if the drug flow in the needle steadily by rate 0.5 cm^3/s, then the speed of the drug flow in the needle is .... (π = 3.14)

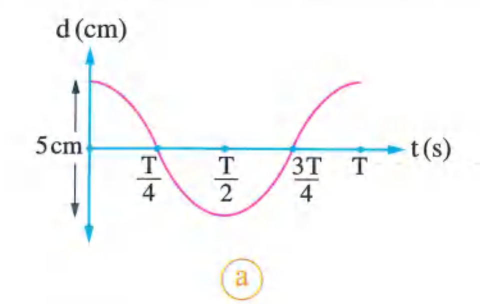
(a) 1.24 m/s
(b) 1.77 m/s
(c) 2.42 m/s
(d) 7.71 m/s

6. A container of thick transparent walls have a material of refractive index 1.52. If it contains a liquid of refractive index 1.44, then the critical angle between them equals ....

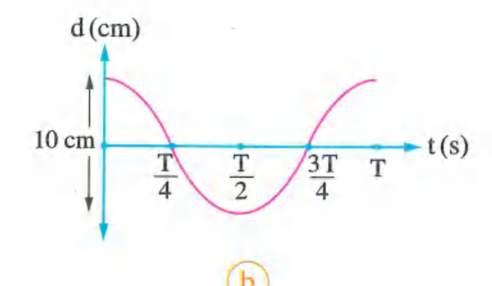
(a) 68.42° and it is located in the container medium
(b) 71.33° and it is located in the container medium
(c) 68.42° and it is located in the liquid
(d) 71.33° and it is located in the liquid

7. In the opposite figure, a simple pendulum has been displaced from its rest position (o) a distance 5 cm to position (x), then it is left to swing making a simple harmonic motion where it completes one oscillation in time T. Which of the following graphs represents the relation between the displacement (d) of the pendulum away from its rest position and the time (t) during that complete oscillation starting from position x?

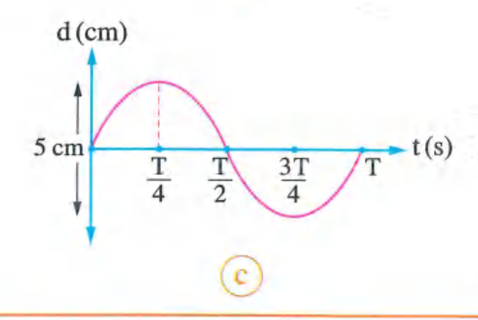




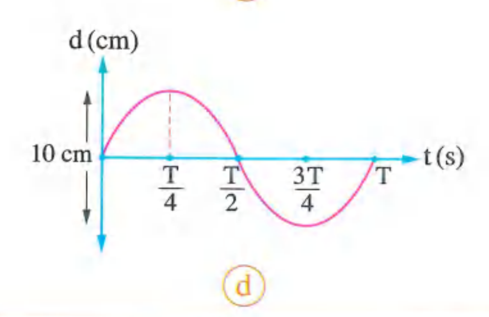
(a)



(b)



(c)

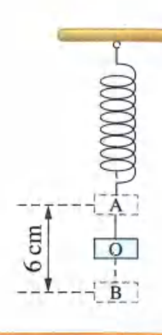


(d)

8. In Young's experiment, if red light was used then the experiment is carried out again with blue light source, the ratio $\frac{(\Delta y)_r}{(\Delta y)_b}$ is ....

(a) greater than 1
(b) less than 1
(c) equal to 1
(d) indeterminable

9 The opposite figure shows a load that is attached to a vibrating spring, so the total distance that is covered by the load during a periodic time equals ....



(a) 3 cm (b) 6 cm
(c) 9 cm (d) 12 cm

10 Water flows steadily in a tube that is branched into several identical branches. If the diameter of the main tube is 8 times as large as the diameter of the branched tube and the speed of the water flow in the branched tube is 4 times as large as its speed in the main tube, then the number of the branched tubes is ....

(a) 4 (b) 8 (c) 16 (d) 24

11 Which of the following physical quantities has a measuring unit?

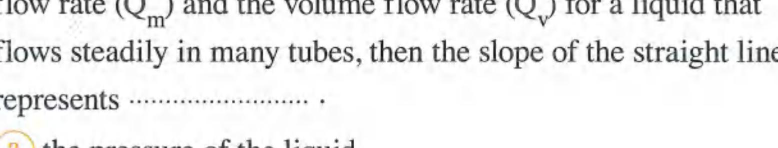
(a) Absolute refractive index
(b) Viscosity coefficient
(c) Dispersive power
(d) Relative refractive index

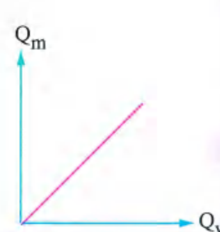
12 From the opposite figure, the angle of reflection of the ray from the mirror equals ....

30°

(a) 30° (b) 40°
(c) 60° (d) 90°

13 The opposite graph represents the relation between the mass flow rate (Q_m) and the volume flow rate (Q_v) for a liquid that flows steadily in many tubes, then the slope of the straight line represents ....





(a) the pressure of the liquid
(b) the temperature of the liquid
(c) the speed of the liquid flow
(d) the density of the liquid



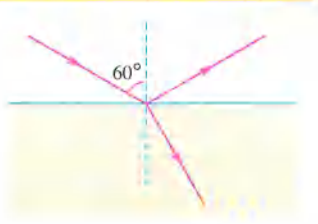
14 The ratio between the dispersive power of a thin prism of an apex angle of 5° and the dispersive power of a thin prism of an apex angle 10° of the same material is ....

(a) $\frac{1}{1}$ (b) $\frac{1}{2}$ (c) $\frac{2}{1}$ (d) $\frac{3}{2}$

15 As the differences in temperature between the layers of air close to the ground decreases, the probability of occurrence of mirage phenomenon ....

(a) decreases (b) increases
(c) doesn't change (d) will be indeterminable

16 A light beam falls from air on the surface of a transparent medium as in the opposite figure. A part of it reflects and another part refracts where the reflected and the refracted rays are perpendicular, then the critical angle of the transparent medium with air equals ....



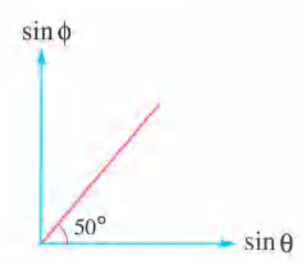
(a) 35.26° (b) 53.26° (c) 45.26° (d) 54.26°

17 If the distance between the first crest and the z crest of a transverse wave is y, then the wavelength of the wave equals ....

(a) $\frac{z-1}{y}$ (b) $\frac{y}{1}$ (c) $\frac{z}{y}$ (d) $\frac{y}{z-1}$

18 The opposite graph represents the relation between sine of the angle of incidence (sin ϕ) and sine of the angle of refraction (sin θ) for a light wave when it travels from air to another medium, so the speed of the wave in the medium equals ....

(Knowing that: $c = 3 \times 10^8$ m/s)

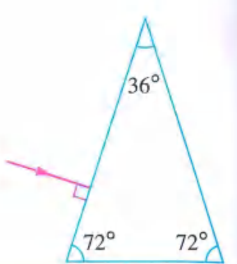


(a) 2×10^8 m/s (b) 1.6×10^8 m/s (c) 2.5×10^8 m/s (d) 3×10^8 m/s

19 By increasing the distance between the double-slit barrier and the observation screen in Young's experiment, the ....

(a) centers of fringes become more distant from each other
(b) centers of fringes become less distant from each other
(c) distances between fringes don't change
(d) number of bright and dark fringes increases

20 The opposite figure represents a triangular prism of refractive index 1.8 where a light ray falls on one of its faces, then the number of total reflections inside the prism equals ....



(a) 1 (b) 2

(c) 3 (d) 4

Second — Answer the following questions (21 : 23)

21 **What happens to** the net force affecting a metal object during its fall through a viscous liquid? **Explain.**

....

....

....

....

22 Two sound waves x, y are propagating in the same medium with periodic times T, 2 T respectively, **calculate** the ratio between the wavelengths of the two waves ($\frac{\lambda_x}{\lambda_y}$).

....

....

....

23 A light ray falls perpendicularly on one of the faces of a triangular prism of apex angle 35°, so it emerges from the prism deviated from its original path by an angle of 28° **Calculate** the refractive index of the prism's material for this light ray.

....

....

....

....

....

....

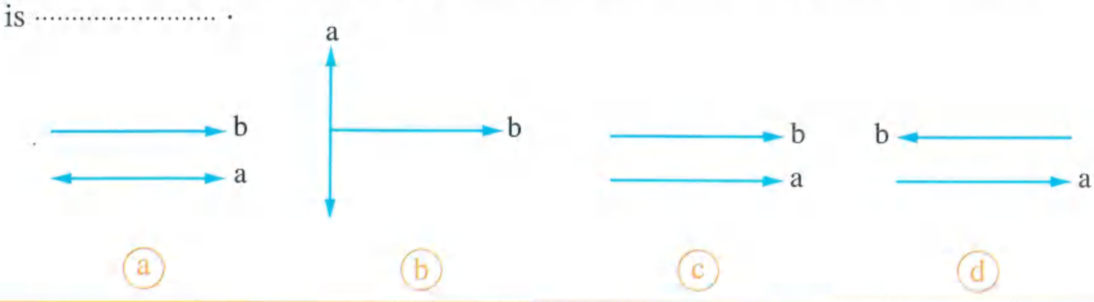
....

General Exam 5



First Choose the correct answer (1 : 20)

1 The figure that represents the direction of vibration of the particles of medium (a) relative to the direction of propagation of a transverse wave (b) in this medium is ....



2 The ratio between the first angle of incidence and the angle of emergence of a light ray, that falls on one of the faces of a triangular prism which is at the minimum deviation position, ...

(a) is greater than 1

(b) is less than 1

(c) is equal to 1

(d) depends on the value of the apex angle of the prism

3 A square plate of side length 10 cm is sliding on another static plate where there is a layer of liquid between them whose coefficient of viscosity is 1.2 N.s/m^2. If the upper plate moves with a uniform velocity of 0.2 m/s due to a tangential force of 0.6 N, then the thickness of the liquid layer is ....

(a) 1 mm (b) 2 mm (c) 3 mm (d) 4 mm

4 Two bodies are vibrating, the first body makes 90 complete vibrations in 2 minutes and the second body makes 3 complete vibrations in one second, so the ratio between their periodic times $(\frac{T_1}{T_2})$ equals ....

(a) $\frac{1}{2}$ (b) $\frac{2}{1}$ (c) $\frac{1}{4}$ (d) $\frac{4}{1}$

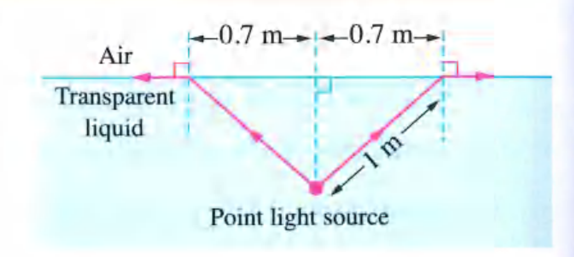
5 At inhalation, the air flows through the trachea with a speed of 15 cm/s. If the cross-sectional area of each of the two branches of the trachea are quarter that of the main trachea and considering the air flow is steady, then the speed of the air flow in each branch is ....

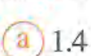
(a) 7.5 cm/s (b) 15 cm/s (c) 30 cm/s (d) 45 cm/s

6 When carrying out Young's experiment two times using two different light sources where $\lambda_1 > \lambda_2$, keeping the dimensions of the apparatus unchanged then the ratio of the distance between the centers of two successive fringes of the same type in case of the first light to the distance between the centers of two successive fringes of the same type in case of the second light $\left(\frac{(\Delta y)_1}{(\Delta y)_2}\right)$ is ....

(a) less than 1
(b) greater than 1
(c) equal to 1
(d) indeterminable

7 The opposite figure shows light rays that are produced from a point light source placed inside a transparent liquid. So, the refractive index of this liquid is ....





(a) 1.4 (b) 1.7
(c) 1.8 (d) 2

8 When the school's bell rings, its sound reaches the ears of students in the form of .... waves.

(a) longitudinal
(b) transverse
(c) longitudinal and transverse
(d) electromagnetic

9 A thin prism is submerged in water where it deviates the light rays that fall on it from the water by an angle of 0.9°. If the refractive index of the prism's material is 1.5 and the refractive index of water is 1.33, the apex angle of the prism is .... approximately.

(a) 8° (b) 7° (c) 6° (d) 5°

10 If the speed of the light rays through a transparent medium is 2.4×10^8 m/s, then the critical angle of the medium with air equals .... ($c = 3 \times 10^8$ m/s)

(a) 39.4° (b) 42.61° (c) 48.2° (d) 53.13°

11 In the double-slit experiment, a student used laser rays of wavelength 632.8 nm and he placed the observation screen 1 m away from the double-slit. He finds that the distance between the center of the first bright fringe and the center of the central fringe is 3.2 mm, so the distance between the two slits is ....

(a) 19.8 mm (b) 198 μm (c) 50.6 mm (d) 506 μm

12 The following measuring units are equivalent to each other except ....

(a) $kg.m^2/s^2$ (b) $N.s/m^2$ (c) $J.s/m^3$ (d) kg/m.s

13 Firemen use water hoses of narrow nozzles when they extinguish fire because the rushing speed of ....

(a) water increases by decreasing the cross-sectional area of the nozzle
(b) water decreases by decreasing the cross-sectional area of the nozzle
(c) water increases by increasing the cross-sectional area of the nozzle
(d) water is constant whatever the cross-sectional area of the nozzle changes

14 An optical fiber that has a material of refractive index 2.1, is coated by an external layer, so the refractive index of the external layer that makes the critical angle between the two layers equal 32° is ....

(a) 1.11 (b) 1.9 (c) 3.96 (d) 4.32

15 A light ray falls on one of the faces of a triangular prism at an angle of incidence 60°. If the apex angle of the prism is 30° and its refractive index is $\sqrt{3}$, the light ray ....

(a) emerges tangent to the opposite face
(b) totally reflects and doesn't emerge at the opposite face
(c) emerges normal to the opposite face
(d) changes its path by 90°

16 A thin prism of apex angle 8°, dispersive power of its material is 0.037 and the refractive index of its material for the yellow color is 1.54, therefore the angular dispersion of light in it equals ....

(a) 0.11° (b) 0.12° (c) 0.14° (d) 0.16°

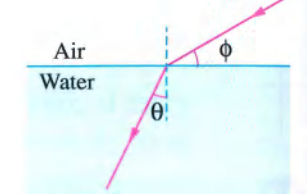
17 If the refractive index of medium A is double the refractive index of medium B, the ratio between the speed of the light in medium A and the speed of the light in medium B equals ....

(a) $\frac{1}{2}$ (b) $\frac{2}{1}$ (c) $\frac{1}{4}$ (d) $\frac{4}{1}$

18 Light rays fall on two thin prisms, the apex angle of the first prism is double the apex angle of the second prism and the refractive index of the first prism is 1.5 and the refractive index of the second prism is 1.2. So, the ratio between the angle of deviation of the first prism and the angle of deviation of the second prism respectively equals ....

(a) $\frac{10}{1}$ (b) $\frac{20}{1}$ (c) $\frac{5}{1}$ (d) $\frac{1}{2}$

19 The opposite figure represents a light ray that transfers from air to water of refractive index $\frac{4}{3}$, so the relation that represents the refraction in this case is ....



(a) $\frac{\sin \phi}{\sin \theta} = \frac{4}{3}$

(b) $\frac{\sin \theta}{\sin \phi} = \frac{4}{3}$

(c) $\frac{\sin (90 - \phi)}{\sin \theta} = \frac{4}{3}$

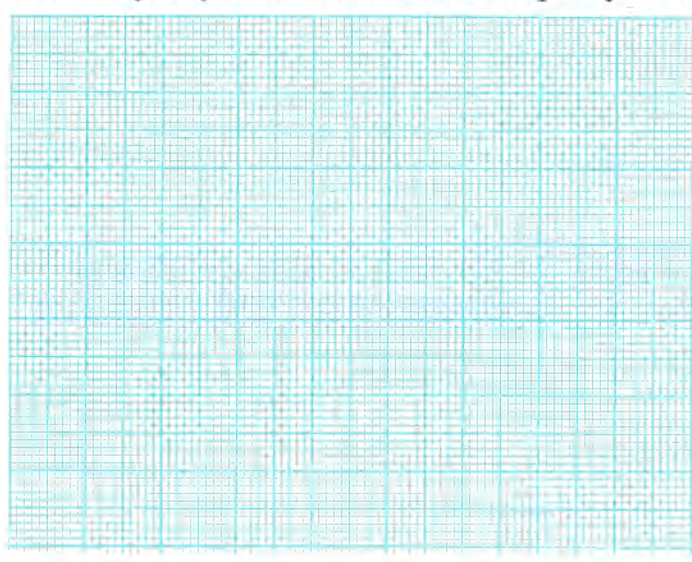
(d) $\frac{\sin (90 - \phi)}{\sin (90 - \theta)} = \frac{4}{3}$

20 In the diffraction phenomenon, the waves path changes when they ....

(a) transfer from a medium to another
(b) fall on a reflecting surface
(c) encounters a sharp edge
(d) collide with another wave

Second Answer the following questions (21 : 23)

21 **Draw** on the following graph paper the sine curve (displacement-time) that represents two waves of the same kind A and B that propagate in the same medium and have the same amplitude but the frequency of wave A is half the frequency of wave B.



22 An empty tank gets filled with an amount of kerosene of mass 100 kg using a hose where the kerosene emerges from its nozzle with a speed of 0.2 m/s, so if the tank is filled during 25 minutes, **calculate** the radius of the hose nozzle.
(Knowing that: Density of kerosene = 900 kg/m^3, π = 3.14)

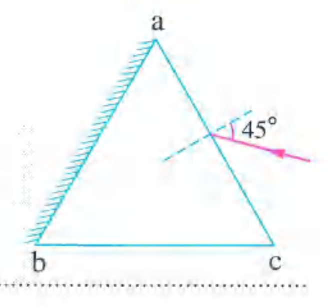
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23 The opposite figure represents a light ray that falls at an angle of 45° on the face (ac) of an equilateral triangular prism that has a material of refractive index $\sqrt{2}$ and its external face (ab) is silvered by a reflecting layer. **Calculate** the angle of emergence of the light ray from the prism.



....

....

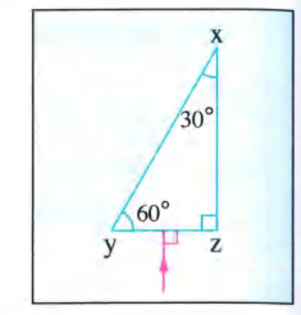
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General Exam 6



First Choose the correct answer (1 : 20)

1 The opposite figure shows a light ray falling perpendicular to face yz of a right angle triangular prism of refractive index 1.6. The prism is submerged in a liquid of refractive index 1.3, then the angle of incidence of the ray on face xy will be ....



(a) 90°
(b) greater than the critical angle between the prism and the liquid
(c) less than the critical angle between the prism and the liquid
(d) equal to the critical angle between the prism and the liquid

2 If the angle of minimum deviation of a light ray that falls on one of the faces of an equilateral triangular prism is 30°, then ....

	The angle of emergence	The refractive index of the prism
(a)	30°	$\sqrt{2}$
(b)	30°	$\frac{\sqrt{3}}{2}$
(c)	45°	$\frac{\sqrt{3}}{2}$
(d)	45°	$\sqrt{2}$

3 When a wave transfers between two different media, then ....

	The speed of the wave	The frequency of the wave
(a)	remains constant	remains constant
(b)	remains constant	changes
(c)	changes	remains constant
(d)	changes	changes

4 The opposite figure represents a liquid that flows steadily in a tube where it enters from terminal A and emerges from terminal B, then ....

A
B

(a) the speed of the liquid at A is equal to the speed of the liquid at B
(b) the flow rate of the liquid at A is less than the flow rate of the liquid at B
(c) the speed of the liquid at A is less than the speed of the liquid at B
(d) the flow rate of the liquid at A is greater than the flow rate of the liquid at B

5 A light ray falls perpendicularly on one of the faces of a triangular prism of refractive index 1.65 and the ray emerges tangent to the opposite face, so the apex angle of the prism is ....

(a) 37° (b) 48° (c) 52° (d) 58°

6 In the steady flow, the ratio between the number of streamlines in the wide cross-section of the tube and the number of streamlines in the narrow cross-section of the tube is ....

(a) greater than 1 (b) less than 1
(c) equal to 1 (d) the answer can't be determined

7 ✻ In Young's double-slit experiment for measuring the wavelength of the red light, the center of the bright fringe of the second order is formed at 4×10^{-3} m away from the center of the central fringe. If the observation screen is 200 cm away from the double-slit and the distance between the two slits is 7×10^{-4} m, the wavelength of the used red light equals ....

(a) 680 nm (b) 690 nm (c) 700 nm (d) 720 nm

8 A sound source produces 60 vibrations within 1.5 s and the produced wave propagates in air with a speed of 340 m/s, then the distance between the centers of a compression and a successive rarefaction equals ....

(a) 2.8 m (b) 4.25 m (c) 5.67 m (d) 8.5 m

9. If the angular dispersion equalize in two thin prisms, where the apex angle of the first prism is 6° and its refractive indices for the blue and the red light respectively are 1.68 and 1.62 and the apex angle of the second prism is 9° and its refractive index for the blue light is 1.65, then the refractive index for the red light in the second prism is ....

(a) 1.64 (b) 1.63 (c) 1.62 (d) 1.61

10. Water flows steadily through a tube of inner diameter of 3.5 cm with a speed of 0.8 m/s. If the density of water is 1000 kg/m^3, then the mass flow rate equals ....

(a) 0.385 kg/s (b) 0.77 kg/s (c) 1.155 kg/s (d) 1.54 kg/s

11. A light ray falls at an angle of 45° on one of the faces of a cuboid that is made of a transparent material of refractive index 1.75 and emerges from the opposite face to air, then ....

	The angle of refraction of the light ray inside the cuboid is	**The angle of emergence of the light ray from the cuboid is**
(a)	32.4°	45°
(b)	32.4°	30°
(c)	23.8°	45°
(d)	23.8°	30°

12. In the opposite figure, the angle of reflection of the light ray on mirror B equals ....

(a) 30° (b) 50°
(c) 60° (d) 90°

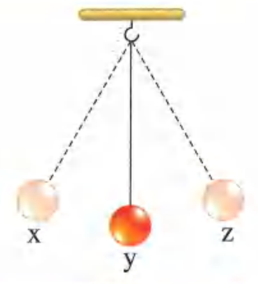
13. From the factors that affect the viscosity coefficient, ...

(a) the area of the moving layer of the fluid
(b) the temperature of the fluid
(c) the speed of the fluid
(d) thickness of the fluid layer

14. A light ray falls on a barrier with a very narrow rectangular slit, so the light is diffracted and the produced waves were received on a screen forming bright and dark fringes. What happens to each of the width and the brightness of the bright fringes as getting away from the central fringe on both sides?

	The width	The brightness
(a)	Doesn't change	Doesn't change
(b)	Doesn't change	Decreases
(c)	Decreases	Doesn't change
(d)	Decreases	Decreases

15. In the opposite figure, the pendulum makes a half of an oscillation when it moves from position ....



(a) x to z
(b) x to y
(c) y to x
(d) y to z

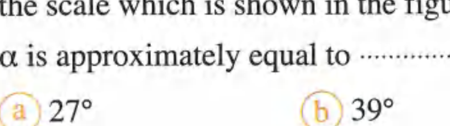
16. When the frequency of a sound wave that propagates in a medium is doubled by its source, then its ....

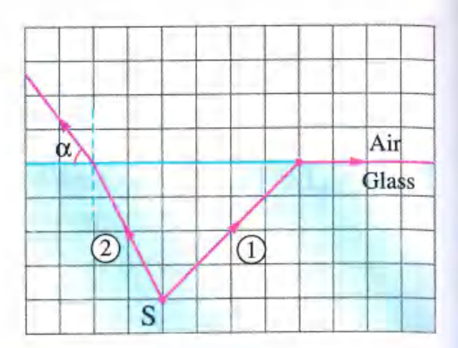
(a) wavelength decreases to its half
(b) wavelength doubles
(c) speed decreases to its half
(d) speed doubles

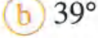
17. The relative refractive index ($_1n_2$) between two media is less than one when ....

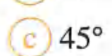
(a) the speed of light in the first medium is greater than its speed in the second medium
(b) the angle of incidence in the first medium is greater than the angle of refraction in the second medium
(c) the absolute refractive index of the first medium is smaller than the absolute refractive index of the second medium
(d) the wavelength of light in first medium is smaller than the wavelength of light in the second medium

18 Two light rays ①, ② are propagating from the source (S) through glass to air as represented by the scale which is shown in the figure, then angle α is approximately equal to ....





(a) 27°  (b) 39°

 (c) 45°  (d) 51°

19 The ratio between the deviation angle of the violet light and the deviation angle of the red light is .... after they emerge from a triangular prism at minimum deviation position.

(a) greater than 1 (b) less than 1

(c) equal to 1 (d) indeterminable

20 In Young's experiment, a monochromatic light of wavelength ($\lambda_1 = 4000\ \mathring{A}$) is used, then the experiment is carried out again with another monochromatic light of wavelength ($\lambda_2 = 7000\ \mathring{A}$). Keeping the other apparatus dimensions unchanged, so the ratio of the separating distance between the centers of two successive fringes of the same type in the two cases $\left(\frac{(\Delta y)_1}{(\Delta y)_2}\right)$ equals ....

(a) $\frac{8}{15}$ (b) $\frac{14}{15}$ (c) $\frac{4}{7}$ (d) $\frac{7}{4}$

Second Answer the following questions (21 : 23)

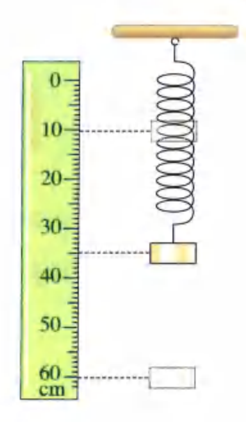
21 It's noticed that the aquatic plants in the Nile river are found near the riverside and not in the middle of the watercourse. **Explain this sentence.**

....

....

....

22 A body is suspended in a vertical spring coil besides a ruler where it vibrates between the marks 10 cm, 60 cm, **calculate** the distance covered by the body during two complete vibrations.



....

....

....

....

....

23 If you have two flexible transparent materials A and B where the refractive index material A is larger than that of B and we want to use them to make an optical fiber which has two layers, **then which** of them is used to make the inner core of the optical fiber **and which** of them is used to make the external layer of it? **And why?**

....

....

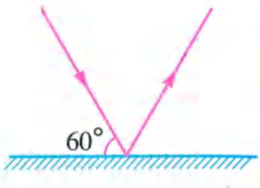
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General Exam 7



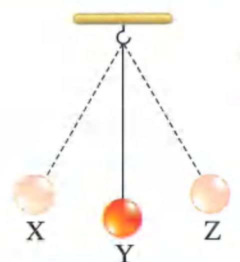
First Choose the correct answer (1 : 20)

1 In the opposite figure, the angle of reflection of the light ray from the mirror equals ....



(a) 30°
(b) 45°
(c) 60°
(d) 120°

2 During the vibration of the pendulum shown in the opposite figure, the velocity of the pendulum load equals zero at ....



(a) position X only
(b) position Y only
(c) position Z only
(d) positions X and Z

3 In Young's experiment a yellow light source is used to form interference fringes on the observation screen. So, to make the interference fringes more distant from each other, a .... light source should be used.

(a) green
(b) violet
(c) blue
(d) red

4 The bottom of a swimming pool may not be seen when looking at it from the air because of the .... of the light.

(a) interference
(b) diffraction
(c) refraction
(d) total internal reflection

5 The ratio between the first refraction angle and the second angle of incidence in a triangular prism that is set at the minimum deviation position $(\frac{\theta_1}{\phi_2})$ is ....

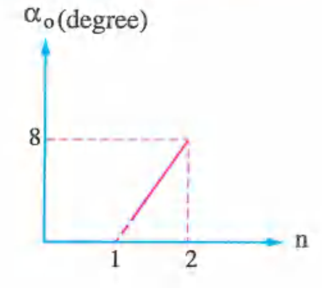
(a) greater than one
(b) less than one
(c) equal to one
(d) indeterminable




6 If the refractive index of diamond is 2.4, then the maximum angle of incidence of a light ray that falls inside the diamond to emerge to the air equals ....

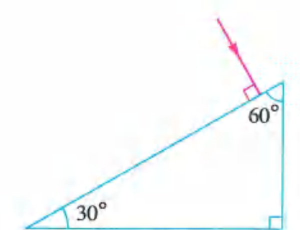
(a) 40.2° (b) 36.2° (c) 32.4° (d) 24.6°

7 The opposite graph shows the relation between the angle of deviation (α_o) of light for several thin prisms that have the same apex angle and the refractive index (n) of the material of these prisms, then the apex angle of any one of them equals ....



(a) 4° (b) 6°
(c) 8° (d) 10°

8 The opposite figure represents a light ray that falls normally on one of the faces of a triangular prism of refractive index 1.5, so its emergence angle from the prism equals ....

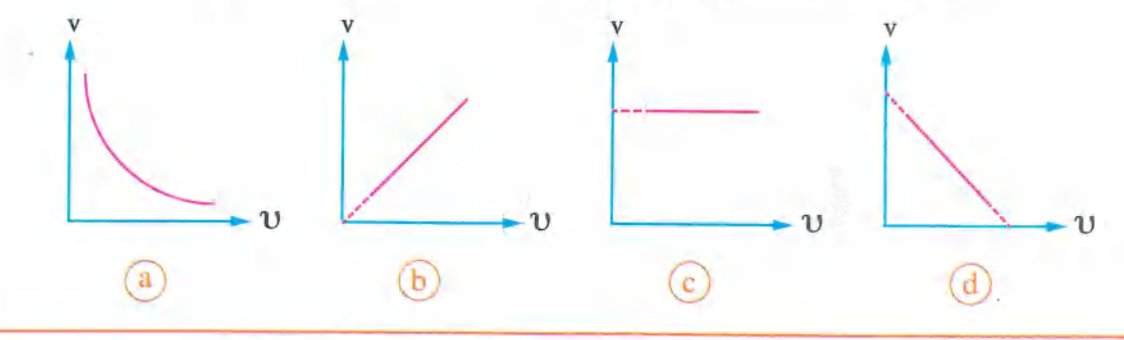


(a) 30° (b) 41.81°
(c) 48.59° (d) 60°

9 A tangential force acts on a wooden plate to slide on a layer of liquid that covers the ground of a hall. If this force is doubled, then the viscosity coefficient of the liquid ....

(a) decreases to its quarter
(b) decreases to its half
(c) increases to the double
(d) doesn't change

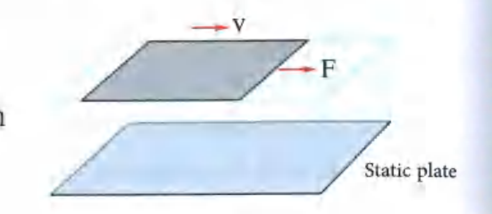
10 Which of the following graphs represents the relation between the speed of propagation for different sound waves (v) in air and the frequency (υ) for each of them?



11 A triangular prism of apex angle 45° and refractive index 1.66 is submerged in a liquid of refractive index 1.33. If the prism is in the minimum deviation position, the angle of deviation of light in the prism in this case equals ....

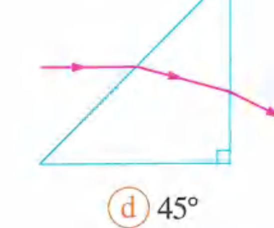
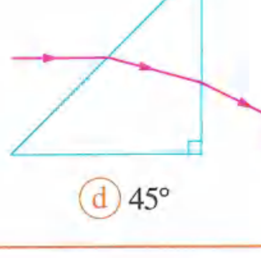
(a) 9.29° (b) 12.06° (c) 16.19° (d) 33.88°

12 In the opposite figure, when liquid A is placed between the two plates and the upper plate is affected by a tangential force of 100 N, the plate moves with a uniform speed of 0.2 m/s and when replacing liquid A by liquid B and the upper plate is affected by a tangential force of 50 N, the plate moves with a uniform speed 0.4 m/s, then the ratio between the viscosity coefficients of the two liquids $\left(\frac{(\eta_{vs})_A}{(\eta_{vs})_B}\right)$ is ....



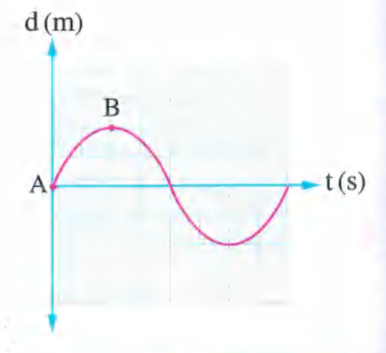
(a) $\frac{1}{1}$ (b) $\frac{1}{2}$ (c) $\frac{2}{1}$ (d) $\frac{4}{1}$

13 The opposite figure shows an isosceles right angle triangular prism of refractive index 1.5. If a light ray falls on one of its faces parallel to the base, it emerges from the opposite face with an angle of emergence that equals ....

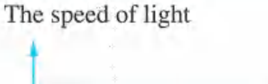
(a) 16.87° (b) 25.8° (c) 28.1° (d) 45°

14 The opposite graph shows the relation between the vertical displacement of the motion of a medium particle (d) and the time (t) of a wave. If the time interval between A and B is 0.15 s, then the frequency of the wave equals ....



(a) $\frac{1}{15}$ Hz (b) $\frac{1}{3}$ Hz
(c) $\frac{5}{3}$ Hz (d) $\frac{20}{3}$ Hz

15 The opposite graph shows the speed of light in four media A, B, C and D, then the optically denser medium is ....





(a) medium A (b) medium B
(c) medium C (d) medium D



16 A thin prism whose material refractive index for yellow light is 1.5, therefore the refractive indices of the prism's material for red and blue lights are .... respectively.

(a) 1.3, 1.4 (b) 1.6, 1.7 (c) 1.4, 1.6 (d) 1.3, 1.6

17 ✻ Three students A, B, C carried out Young's double-slit experiment using a red laser beam and the following table shows the distances between the parts of the experiment that is carried out by each one of them.

	Student (A)	Student (B)	Student (C)
The separating distance between the two slits	0.15 mm	0.175 mm	0.15 mm
The distance between the observation screen and the double slit	0.6 m	0.8 m	0.8 m

Therefore, the arrangement of the three students according to the resolution of interference that is obtained in the experiments is ....

(a) C < A < B (b) B < A < C (c) C < B < A (d) A < B < C

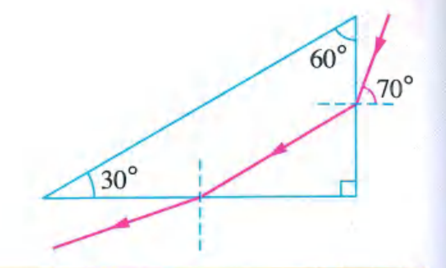
18 Three water taps were used each one separately to fill a basin. The first filled the basin in one hour, the second in $\frac{1}{2}$ an hour while the third filled it in $\frac{1}{4}$ an hour, then the time required to fill the basin when opening all taps together equals ....

(a) $\frac{1}{7}$ hour (b) $\frac{3}{4}$ hour (c) $\frac{7}{9}$ hour (d) $\frac{7}{8}$ hour

19 Bright fringes and dark fringes are produced in each of interference and diffraction phenomena of light. Does the distance between the centers of two successive fringes of the same type differ in each of the two phenomena?

	Interference phenomenon	Diffraction phenomenon
(a)	Differs	Differs
(b)	Differs	Doesn't differ
(c)	Doesn't differ	Differs
(d)	Doesn't differ	Doesn't differ

20 In the opposite figure, the apex angle of the triangular prism is ....



(a) 30° (b) 60°

(c) 70° (d) 90°

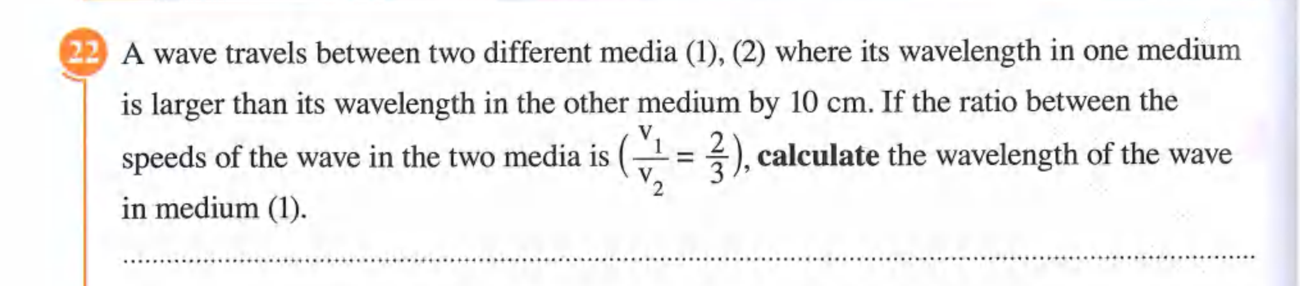
Second Answer the following questions (21 : 23)

21 **Explain why** firemen use hoses with narrow nozzles as in the opposite figure when they extinguish fires.
And what happens if hoses of wider nozzles are used?

....

....

....



22 A wave travels between two different media (1), (2) where its wavelength in one medium is larger than its wavelength in the other medium by 10 cm. If the ratio between the speeds of the wave in the two media is $\left(\frac{v_1}{v_2} = \frac{2}{3}\right)$, **calculate** the wavelength of the wave in medium (1).

....

....

....

23 The opposite figure shows light rays that fall from a liquid on the interface with air, **calculate:**

(a) The value of angle θ.

(b) The absolute refractive index of the liquid.

$\phi_1 = 59°$ 22° θ Air Liquid

....

....

....

....

General Exam 8



First Choose the correct answer (1 : 20)

1 A water pipe of diameter 2.5 cm is used to pour an amount of water of mass 11 kg in a bowl. If it takes 10 s to pour this amount into the bowl, then the speed of the water while emerging from the pipe equals ....

(Knowing that: $\rho_{water} = 1000$ kg/m^3, $\pi = \frac{22}{7}$)

(a) 2 m/s (b) 2.24 m/s (c) 3 m/s (d) 3.32 m/s

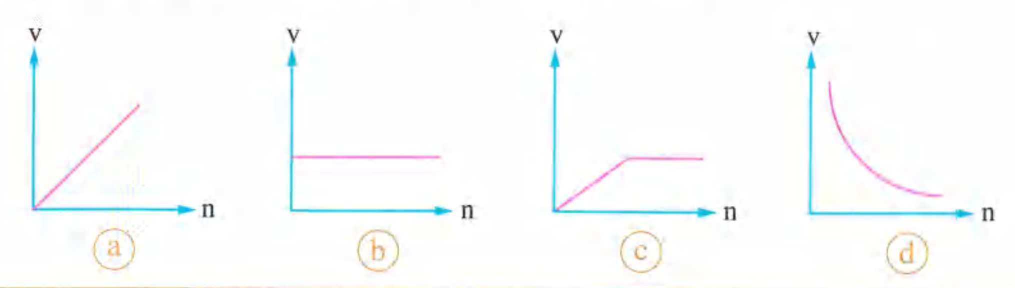
2 If the ratio between the frequency of the sound of a man and the frequency of the sound of a girl is $\frac{3}{4}$, then the ratio between the speed of the man's sound and the speed of the girl's sound in air respectively equals ....

(a) $\frac{1}{1}$ (b) $\frac{3}{4}$ (c) $\frac{4}{3}$ (d) $\frac{9}{16}$

3 A thin prism whose refractive index for the blue light is 1.72 and refractive index for the red light is 1.68, hence its average refractive index equals ....

(a) 1.66 (b) 1.69 (c) 1.7 (d) 1.71

4 The graph that represents the relation between the speed of light (v) in several media and the absolute refractive index (n) for each of them is ....



5 In the opposite figure, two thin prisms x, y of refractive indices 1.5, 1.6 respectively are positioned opposite to each other. If the apex angle of prism x is 9° then the apex angle of prism y that cancels the deviation of light beam due to prism x equals ....

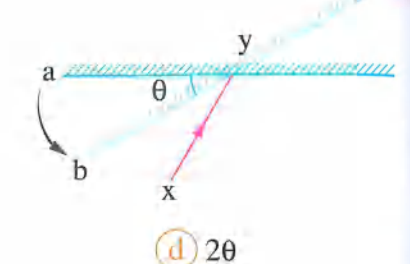
x

y

(a) 8° (b) 7.5°

(c) 7° (d) 6°

6. In the opposite figure, a light ray xy falls on a plane mirror in position (a), then the mirror is rotated with an angle θ about an axis perpendicular to the page at the point of incidence to be in position (b), so the angle of reflection increases by a value of ....

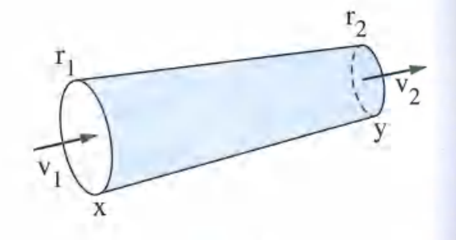


(a) $\frac{\theta}{2}$ (b) $\frac{\theta}{4}$ (c) θ (d) 2θ

7. A hammer beats one end of a very long metal tube where there is a detector at the other end of the tube that detects two sounds with a time difference between them of 0.2 s. If the speed of sound in air is 320 m/s and in the metal of the tube is 5000 m/s, then the length of the metal tube is approximately ....

(a) 17.8 m (b) 34.3 m (c) 49 m (d) 68.4 m

8. The opposite figure shows a tube that carries a steadily flowing liquid. If the speed of the liquid at the two cross-sections of the tube (x and y) are 0.1 m/s and 0.625 m/s respectively, then the ratio between the radii of the tube $\left(\frac{r_1}{r_2}\right)$ equals ....



(a) $\frac{2}{5}$ (b) $\frac{5}{2}$ (c) $\frac{4}{25}$ (d) $\frac{25}{4}$

9. In Young's double-slit experiment, a light of wavelength λ passes through two slits where the distance between them is d, so interference fringes appear on the observation screen that is at a distance R from the slits. If another light of wavelength 1.5 λ is used, the distance between the two slits should be .... to have the same interference pattern.

(a) $\frac{d}{1.5}$ (b) $\frac{d}{0.75}$ (c) 0.75 d (d) 1.5 d

10. The critical angle between two media of different optical densities is 53.13°. If the absolute refractive index of the denser medium is $\frac{5}{3}$, then the absolute refractive index of the rarer medium is equal to ....

(a) 1.33 (b) 1.51 (c) 1.67 (d) 2.33

11. A triangular prism of apex angle 45° and refractive index 1.6 is set on the minimum deviation position, so the angle of incidence of the light ray equals ....

(a) 13.8° (b) 17.3° (c) 30.5° (d) 37.8°

12 When a light ray transfers from an optically rarer medium to an optically denser medium with an angle of incidence that doesn't equal zero, the light ray ....

(a) reflects on itself (b) refracts
(c) totally reflects (d) doesn't suffer any deviation

13 Water flows with speed v through a main pipe that is branched into a number of pipes each of diameter $\frac{1}{15}$ of the main pipe's diameter. So, to keep the speed of flow in the branched pipes the same as in the main pipe, the number of the branched pipes should be ....

(a) 100 (b) 125 (c) 200 (d) 225

14 In the opposite figure, point A represents the position of one of the medium molecules in which a transverse wave is propagating at a certain moment. If this point has become a trough after 1.5 s from this moment, so the periodic time of this wave equals ....

Direction of wave motion

A

(a) 2 s (b) 4 s (c) 6 s (d) 8 s

15 The opposite figure represents a light ray that falls on one of the faces of a glass cuboid of refractive index 1.5, so the angle between the reflected ray and the refracted ray equals ....

50°

(a) 93° (b) 93.9° (c) 98° (d) 99.3°

16 The opposite graph represents the relation between the frequency (υ) and the reciprocal of the periodic time ($\frac{1}{T}$) with the same scale for a group of tuning forks that vibrate in air, so the value of θ equals ....

υ(Hz)

θ

$\frac{1}{T}$(s^{-1})

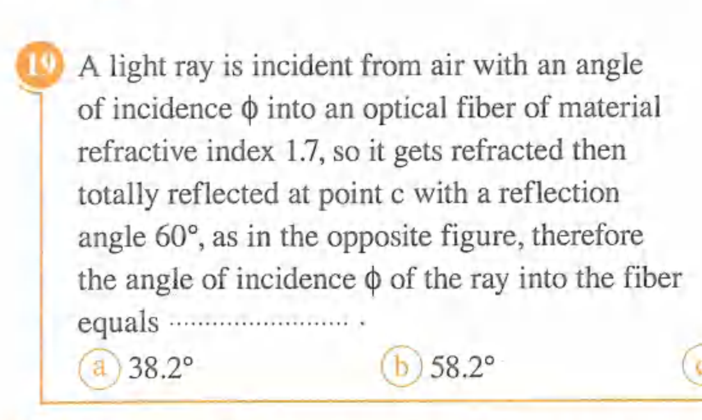
(a) 30° (b) 45° (c) 60° (d) 75°

17 The adjacent fringe to the central fringe in Young's double-slit experiment is ....

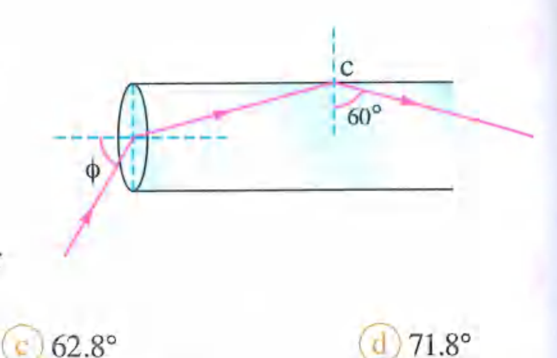
(a) always bright (b) always dark (c) determined by the medium
(d) determined by the wavelength of the used light

18 The ratio between the viscosity coefficient of honey in winter and its viscosity coefficient in summer respectively is ....

(a) greater than 1 (b) less than 1
(c) equal to 1 (d) indeterminable



19 A light ray is incident from air with an angle of incidence ϕ into an optical fiber of material refractive index 1.7, so it gets refracted then totally reflected at point c with a reflection angle 60°, as in the opposite figure, therefore the angle of incidence ϕ of the ray into the fiber equals ....



(a) 38.2° (b) 58.2° (c) 62.8° (d) 71.8°

20 Two parallel light rays, one is blue and the other is green, fall on the boundary surface from an optically denser medium to an optically rarer medium. If the angle of refraction of the green ray is 90°, then the blue ray ....

(a) refracts towards the normal
(b) emerges without suffering any deviation
(c) refracts away from the normal
(d) totally reflects

Second Answer the following questions (21 : 23)

21 **What happens to** the momentum of a metal ball during its falling in a viscous liquid? **Explain.**

....

....

....

22 In the opposite figure, a light ray falls on an equilateral prism of refractive index $\sqrt{2}$,

then find:

(a) The angle of emergence of the ray from the prism.

(b) The angle of deviation of the ray in the prism.

....

....

....

23 **Mention two differences between** diffraction fringes and interference fringes.

....

....

....

General Exam 9



First | Choose the correct answer (1 : 20)

1 The opposite figure shows a light ray that falls on a reflecting surface, so its angle of reflection equals ....



(a) 40°
(b) 50°
(c) 60°
(d) 90°

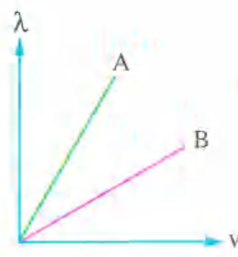
2 A flat metal plate of surface area 0.0375 m^2 slides quickly with a uniform velocity 0.2 m/s on another static plate where there is a liquid layer between them of thickness 3 mm. If the viscosity coefficient of the liquid is 0.25 N.s/m^2, then the tangential force that acts on the sliding plate equals ....

(a) 0.55 N
(b) 0.625 N
(c) 0.732 N
(d) 0.78 N

3 A light ray falls at an angle of incidence ϕ on one of the faces of a triangular prism of an apex angle 35°, then it emerges perpendicularly from the opposite face. If the refractive index of the prism's material is 1.5, then the value of ϕ is ....

(a) 45°
(b) 52.47°
(c) 59.36°
(d) 75°

4 The opposite graph shows the relations between the speeds (v) of two different waves (A and B) and their wavelengths (λ) when they propagate through different media, so which of the following relations is correct for the frequencies (υ) of the two waves?



(a) $\upsilon_A < \upsilon_B$
(b) $\upsilon_A = \upsilon_B \neq 0$
(c) $\upsilon_A > \upsilon_B$
(d) $\upsilon_A = \upsilon_B = 0$

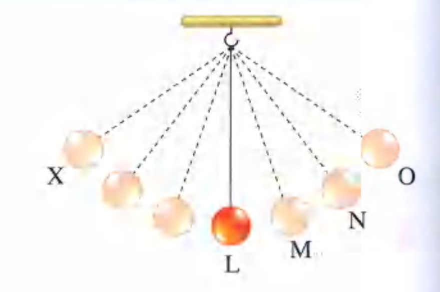
5 If a light ray passes through a slit of width 6×10^{-4} mm, then the diffraction resolution will be much better when the wavelength of the light ray equals ....

(a) 400 nm
(b) 450 nm
(c) 550 nm
(d) 650 nm

6. ❋ A light beam falls on the surface of a transparent material that has a refractive index of 1.55. If the confined angle between the reflected and the refracted rays is 90°, therefore the angle of incidence of the light beam equals .... approximately.
(Knowing that: $\sin(90 - \theta) = \cos\theta$)

ⓐ 15° ⓑ 30° ⓒ 57° ⓓ 68°

7. The opposite figure shows the motion of a simple pendulum from X to O, if the distances NO, MN and LM are equal and the time intervals taken by the pendulum to cover these distances are T_1, T_2, T_3 respectively, then which of the following relations is correct?



ⓐ $T_1 = T_2 = T_3$ ⓑ $T_3 > T_2 > T_1$
ⓒ $T_1 > T_2 > T_3$ ⓓ $T_1 + T_2 = T_3$

8. If the relative refractive index from medium A to medium B is $\frac{1}{\sqrt{2}}$, so the angle of incidence in one of the two media that makes the ray emerges to the other medium tangent to the separating surface between them equals ....

ⓐ 60° ⓑ 45° ⓒ 37° ⓓ 30°

9. If the temperature of a viscous liquid increases, then ....

	The flow rate of the liquid	The resistance of the liquid against the motion of bodies inside it
ⓐ	increases	increases
ⓑ	decreases	increases
ⓒ	increases	decreases
ⓓ	decreases	decreases

10. A thin prism of an apex angle 10° deviates the yellow rays that fall on it by an angle of 5°, then the refractive index of its material for the yellow light equals ....

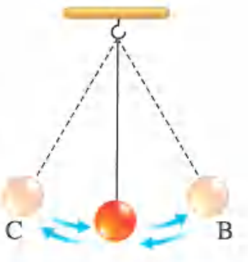
ⓐ 1.45 ⓑ 1.5 ⓒ 1.56 ⓓ 1.59



11 Water flows steadily with a speed of 0.3 m/s in a tube to fill a tank of volume 30 m^3 within 15 minutes, so the cross-sectional area of the tube equals ....

(a) 0.11 m^2 (b) 1 m^2 (c) 6.67 m^2 (d) 60 m^2

12 The opposite figure represents a simple pendulum that moves in a simple harmonic motion, so the ratio between the potential energies of the load at the two positions B and C respectively is ....



(a) $\frac{1}{2}$ (b) $\frac{1}{4}$

(c) $\frac{1}{8}$ (d) $\frac{1}{1}$

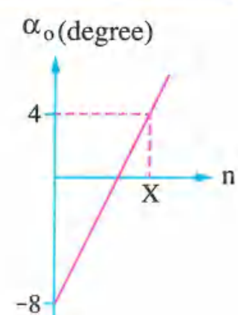
13 A light ray falls perpendicularly on one of the faces of a triangular prism of an apex angle 38°, then it emerges tangent to the opposite face, so the refractive index of the prism's material is ....

(a) 1.53 (b) 1.59 (c) 1.62 (d) 1.68

14 The light ray that has the largest critical angle when it travels from water to air is the .... ray.

(a) violet (b) blue (c) yellow (d) green

15 The opposite graph represents the variation of the deviation angle (α_o) for a light ray in many thin prisms having the same apex angle versus the refractive index (n) of their materials, so the value of X is ....



(a) 1.5 (b) 2

(c) 3 (d) 4

16 When a liquid flows steadily, which of the following choices for the volume flow rate and the mass flow rate is correct?

	Mass flow rate	Volume flow rate
(a)	Variable	Constant
(b)	Variable	Variable
(c)	Constant	Constant
(d)	Constant	Variable

17 The opposite figure shows a light ray falls perpendicularly on one of the faces of a triangular prism that is immersed in a liquid of refractive index 1.33. If the critical angle of the prism's material with air is 42°, then the incident light ray at point b ....

(a) gets totally reflected
(b) gets refracted away from the normal line
(c) gets refracted tangent to the face of the prism
(d) gets refracted toward the normal line

18 A light ray falls on one of the faces of an equilateral triangular prism at angle of 40°, and it refracts parallel to the base of the prism, so it emerges at angle of ....

(a) 20° (b) 40° (c) 60° (d) 90°

19 A thin prism has an apex angle 9°, refractive index of 1.72 for the blue light and 1.68 for the red light, then the angular dispersion of the prism equals ....

(a) 0.12° (b) 0.24° (c) 0.28° (d) 0.36°

20 A light ray falls normal to one of the faces of an equilateral triangular prism, so the second angle of incidence (ϕ_2) equals ....

(a) 30° (b) 45° (c) 60° (d) 90°

Second Answer the following questions (21 : 23)

21 The chance of occurrence of mirage phenomenon increases by the increase of the temperature of air. **Explain.**

....
....
....

22 A vibrating body produces a sound and makes a complete vibration every 4 ms, so the sound reaches a man at 136 m from the body 0.4 s later after producing it, **calculate** the distance between the centers of a compression and a successive rarefaction.

....
....
....
....
....

23 A student used a monochromatic light in Young's double-slit experiment. If the distance between the two slits was 8×10^{-5} m while the distance between the double-slit and the observation screen of the fringes was 100 cm and the distance between the centers of two successive fringes of the same kind was 6 mm, **calculate** the frequency of the used light.
(Knowing that: The speed of the light in air is 3×10^{8} m/s)

....

....

....

....

....

....

General Exam 10



First | Choose the correct answer (1 : 20)

1 A tangential force acts on a plastic plate of area 240 cm^2 to slide it with a speed of 0.4 m/s on another static plate where there is a layer of liquid of thickness 5 mm between them. If the viscosity coefficient of the liquid is 2.1 $N.s/m^2$, then the tangential force that acts on the plastic plate equals ....

(a) 3 N (b) 4 N (c) 6 N (d) 9 N

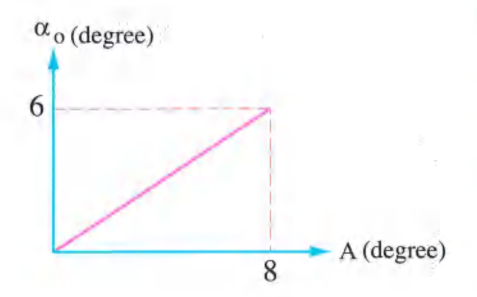
2 A monochromatic light of wavelength 6000 Å falls on a double slit. If the distance between the two slits is 0.001 m and the distance between the slits and the observation screen is 100 cm, then the distance between the fourth bright fringe and the fifth bright fringe equals ....

(a) 0.003 m (b) 0.012 m (c) 9×10^{-4} m (d) 6×10^{-4} m

3 A thin prism of average refractive index 1.5 and the ratio between the refractive indices of the prism's material for blue and red lights $\left(\frac{n_b}{n_r}\right)$ equals $\frac{23}{20}$, therefore the refractive index of prism's material for blue light (n_b) equals ....

(a) 1.4 (b) 1.5 (c) 1.6 (d) 1.7

4 The opposite graph shows the relation between the apex angle (A) of several thin prisms that are made of the same material and the angle of deviation (α_o) of a light ray through each of them, so the refractive index of the prisms' material is ....



(a) 1.3 (b) 1.4
(c) 1.5 (d) 1.75

5 A pipe that has two different cross-sectional areas, one at the ground floor of 15 cm^2 and one at the upper floor of 2.5 cm^2 and water flows steadily through it. If the speed of water at the ground floor is 2 m/s, then ....

	The volume flow rate (m^3/s)	The speed of water at the upper floor (m/s)
a	10^{-3}	10
b	10^{-3}	12
c	3×10^{-3}	10
d	3×10^{-3}	12

6 When a light ray falls on one of the faces of an equilateral triangular prism in the position of minimum deviation, the second angle of incidence equals ....

a) 30° b) 45° c) 60° d) 90°

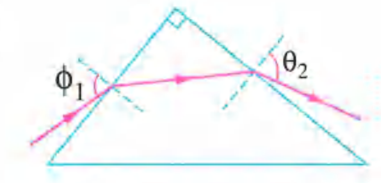
7 If the radius of a tube that carries a steadily flowing liquid decreases to its half, then the mass flow rate ....

a) remains constant b) decreases to its quarter
c) doubles d) quadruples

8 A student uses in the double-slit experiment laser rays of wavelength 6328 Å. If the distance between the double slit and the observation screen is 85 cm and the distance between the centers of the central fringe and the fourth bright fringe is 1.8 mm, then the distance between the two slits is .... approximately.

a) 0.68 mm b) 0.8 mm c) 1 mm d) 1.2 mm

9 The opposite figure shows a light ray that falls at an angle ϕ_1 on one of the faces of a triangular prism in the minimum deviation position.



If the refractive index of the prism's material is 1.366, then the angle of emergence and the minimum deviation angle are .... , ... respectively.

a) 60°, 45° b) 60°, 60° c) 75°, 45° d) 75°, 60°

10 If the speed of light in the two media X and Y are 2.4×10^8 m/s and 1.8×10^8 m/s respectively, then the critical angle between the two media is ....

(a) 48.59° in medium X

(b) 48.59° in medium Y

(c) 53.13° in medium X

(d) 53.13° in medium Y

11 A thin prism deviates light rays with an angle of 3.6°. If the apex angle of the prism is 5°, so the refractive index of its material equals ....

(a) $\sqrt{2}$ (b) 1.5 (c) 1.72 (d) 2.39

12 The interference of light becomes less noticeable in Young's experiment when ....

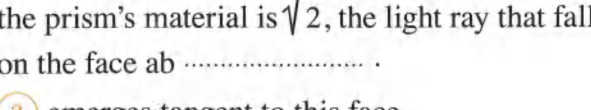
(a) using light of very high intensity

(b) the distance between the two slits decreases

(c) the distance between the two slits increases

(d) the wavelength of the used light increases

13 In the opposite figure, if the refractive index of



the prism's material is $\sqrt{2}$, the light ray that falls on the face ab ....

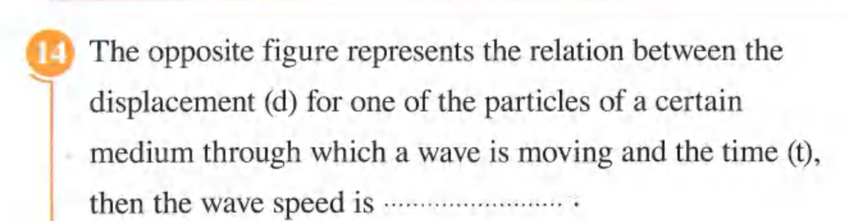
(a) emerges tangent to this face

(b) emerges by angle of emergence of 60°

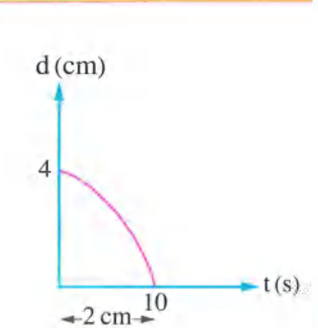
(c) totally reflects

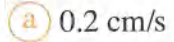
(d) emerges by angle of emergence of 70°

14

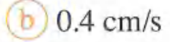


The opposite figure represents the relation between the displacement (d) for one of the particles of a certain medium through which a wave is moving and the time (t), then the wave speed is ....

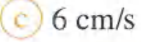




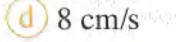
(a) 0.2 cm/s



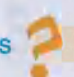
(b) 0.4 cm/s



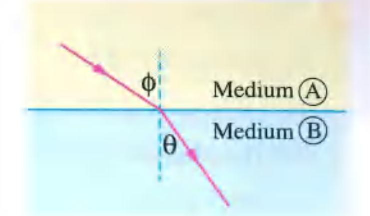
(c) 6 cm/s



(d) 8 cm/s



15 The opposite figure represents a light ray that transfers from medium Ⓐ to medium Ⓑ, so the ratio between the speed of light in medium Ⓐ and the speed of light in medium Ⓑ is ....



(a) greater than 1
(b) less than 1
(c) equal to 1
(d) we can't determine the answer without knowing the values of ϕ, θ

16 In the simple pendulum, which of the following physical quantities doesn't change during the motion of the pendulum?

(a) Displacement
(b) Velocity
(c) Potential energy
(d) Mechanical energy

17 The angle of deviation in the thin prism depends on all of the following except ....

(a) the apex angle of the prism
(b) the first angle of incidence
(c) the wavelength of the falling light
(d) the type of the prism's material

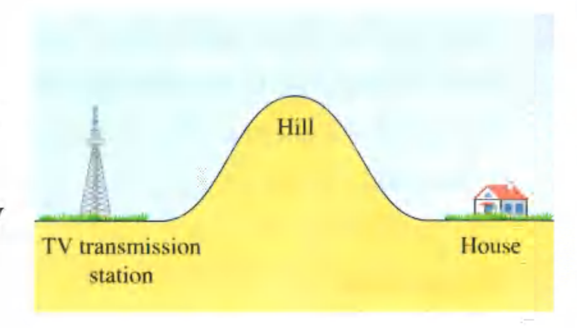
18 When the periodic time of a wave moving in a medium increases, ...

(a) the wavelength increases
(b) the wavelength decreases
(c) the speed increases
(d) the speed decreases

19 A large tube of diameter 30 cm is branched into a number of narrow tubes each of radius 30 mm. If the water flows steadily in the tube and the speed of the water passing in the wide tube equals the speed of the water in the narrow tube, then the number of the narrow tubes equals ....

(a) 25
(b) 50
(c) 75
(d) 100

20 The opposite figure represents a hill that separates between a TV transmission station and a house. Although the hill acts as a shield for the station but the house receives the TV channel perfectly, so what happened to the TV waves at the hill?



(a) Refraction (b) Diffraction
(c) Interference (d) Reflection

Second Answer the following questions (21 : 23)

21 In the opposite figure a simple pendulum is displaced from its original position, then it is left to swing with a simple harmonic motion, **at which position** the speed of the pendulum's bob becomes maximum? **Why** ?

B O A

....

....

....

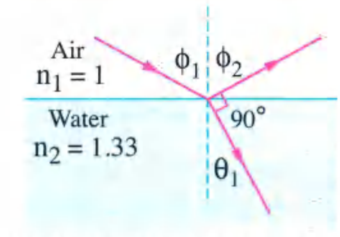
....

22 From your study of the concept of viscosity, **what** is the advice that you can give to the drivers to save fuel on high roads?

....

....

23 From the opposite figure, **calculate** the value of angles ϕ_1 and θ_1
(Knowing that: $\sin(90 - \theta) = \cos\theta$)



....

....

....

....





كيفية طباعة صفحات معينة من ملف معين

مثلا ازاى نطبع الصفحات من صفحة 4 الى صفحة 9

خطوة 1

خطوة 2
اختيار اسم الطابعة بتاعتك

خطوة 3
كتابة الصفحات المراد طباعتها
نكتب رقم 4 ثم نكتب الشرطة دي – ثم نكتب 9

خطوة 4
اختيار نوع الورق

خطوة 5
اختيار A4

خطوة 6